ENGINEERING and MINING JOURNAL.

VOL. XXVI., NO. 25. [WITH TEN SUPPLEMENTS.]

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TABLE FOR THE CONVERSION OF ENGLISH AND METRIC UNITS.

This table will be published every week in the ENGINEERING AND MINING JOURNAL. It is based on the authority of RANKINE, and is correct to the fourth decimal place.

1 Meter = 3·2807 feet.
1 Foot = 0·3048 m.
1 Liter (vol. of 1 kilog. water) = 0·2202 gal.
1 Gallon (vol. of 10 lbs. water) = 4·541 liters.
1 Kilog. per sq. meter = 0·2048 lbs. per sq. ft.
1 Kilog. per sq. mm. = 1422·28 lbs. per sq. in.
1 Lb. per sq. in. = 703·0958 kilogs. per sq. m.
1 Gram = 15·4323 grs.
1 Grain = 0·0648 gram.
1 Kilogrameter = 7·2331 ft.-lbs.
1 Foot-pound = 0·1383 kgm.
1 Atmosphere = 14·7 lbs. per sq. in. = 10·333 kilogs. per sq. meter = 29·922 in. or 760 mm. of mercury = 33·9 ft. or 10⅓ meters water.
1 Kilogram = 2·2046 lbs. av.
1 Pound av. = 0·4536 kilog.
1 Deg. Centigrade = 5-9 deg. F.−32°.
1 Deg. Fahrenheit = 9-5 deg. C. + 32°.
1 Calorie (kilog. water raised 1° C.) = 424 kilogrameters = 3·9683 heat-units.
1 Heat-unit (lb. water raised 1° F.) = 772 ft.-lbs = 0·252 cal.

THE ENGINEERING AND MINING JOURNAL FOR 1879.

With the first of January next, the ENGINEERING AND MINING JOURNAL will enter upon its twenty-seventh volume; and it is with pardonable pride and satisfaction we record the universally admitted fact that during all these years it has maintained its position as the most influential and widely-circulated mining journal in America. Within the past five years, it has absorbed the two important technical papers, the *Coal and Iron Record*, of New York, and the *Mining Review*, of Denver, Colo., and has greatly added to their combined subscription-lists. It has to-day many times the circulation of any other mining paper in America.

As a further evidence of the enterprise which has marked its past history, and as an earnest of what its future will be, we present this magnificent number of the ENGINEERING AND MINING JOURNAL, containing the most beautiful engravings that have ever appeared in any technical paper in this or any other country.

Our friends, whose ranks we are happy to say are steadily increasing, need no assurance from us that neither expense nor labor will be spared to continually improve the JOURNAL in every respect and make it more and more valuable to its patrons in their practical business operations. The history of the past forecasts the future; but to the many thousands not already subscribers, into whose hands this copy of the JOURNAL will come, we may be permitted to state briefly its general plan and policy.

The objects of the JOURNAL are to promote the more economical production of the useful minerals, metals, and their products, and to secure the greater welfare of those employed in these industries.

In the attainment of these objects, it is sought to combine the thorough technical information necessary for the most accomplished and learned engineer and metallurgist with the elementary science and information of every-day practical application which are of interest and value to men engaged in active industrial pursuits, whether as workmen, as foremen, superintendents, brokers, merchants, or investors of capital. Our efforts will be to make the JOURNAL *practically valuable*, popular, and interesting to all these classes without sacrificing accuracy to sensationalism, or filling its pages with the wild hobbies, grotesque theories, or Munchausen descriptions which sometimes pass for "science" or "valuable mining information."

Its technical and scientific information is based upon the highest authority in each department, and is always intended to be of practical value. Its financial and trade information is obtained from the best-informed and most reliable sources, and is unbiased by any personal or special interest. Its aim is to be a thoroughly independent and reliable guide to business men and investors, and the high confidence which it enjoys and the wide influence it exerts in financial and trade circles are the best evidences of the success of these efforts.

In its pages will be found described and beautifully illustrated every system of coal and ore mining; mining and milling machinery of every kind; furnaces and appliances for extracting and manufacturing metals. Gas manufacture (more particularly fuel-gas) and electric lighting will also have due space allotted to them. Every country and every language will be laid under contribution to supply that knowledge which will promote the objects mentioned and which furthers the prosperity of the nation.

It will be the constant aim to make the JOURNAL not less interesting and valuable to the workingman than to the engineer. Its pages will contain special correspondence from the mining regions of every part of America. The compilation of labor notes, giving the rates of wages paid in every part of the world, and the efforts being made in the promotion of coöperation, arbitration, and other measures for the betterment of the laboring classes will always receive special attention.

Honesty, justice, and forbearance are the specifics against strikes, and the adoption of measures for the betterment of the condition of workmen, for promoting economy in the utilization of their earnings and diminishing their cost of living, is quite as important for employers as for their employés.

The fostering of permanent interest in legitimate mining investments is always the care of the ENGINEERING AND MINING JOURNAL, and it strives to inculcate those principles of prudence and circumspection in making investments, and honesty and skill in the technical and financial administration of mines and mining companies, which are the essential foundations for profitable mining investments.

The ENGINEERING AND MINING JOURNAL has no entangling alliances. It is not controlled by any special interest, nor is it the organ of any "bureau" or clique. It has always been the uncompromising opponent of dishonest or disreputable practices, whether they be gilded with the millions of bonanzas or characterize ten-cent gambles in the stocks of some "wild-cat" mining property.

With the firm conviction that mining investments, when prudently made and honestly managed, are the most profitable that can be made, and with the knowledge that this country possesses mines that have never been surpassed in richness by those in any part of the world, we can earnestly advocate these principles as the foundations of the most important industry this country possesses.

THE BUSINESS PROSPECTS OF THE UNITED STATES.

During the inflated period following the civil war, all branches of manufacturing and production apparently flourished. At that time, however, while our ability to produce was less than our home consumption, a protective tariff for most articles of merchandise enabled us to secure prices that yielded immense profits, and values of every thing reached a very high basis. This condition of affairs naturally stimulated the opening of mines, the erection of furnaces, factories, mills, etc., and brought with it over-production, and an inevitable ruinous competition which carried prices down, altogether irrespective of tariff, to the export basis. The bubble had burst.

In the depreciation of values which followed, thousands of millions of dollars of imaginary wealth disappeared; but even at the darkest time it was evident our vast national resources, the elasticity and enterprise of our people, and a return to the forgotten principles of economy and prudence would soon not only recover and bring back prosperity to our industries, but give this country a leading position in the commercial world.

One of the most important conditions for the establishment of prosperity was found to be the securing of a foreign demand for our surplus products. And so well have we succeeded in the attainment of this condition that where, in 1872, the balance of trade was nearly $200,000,000 per annum against us, it is now from $250,000,000 to $300,000,000 in our favor. In 1865, our exports amounted to but $136,940,248. For the first nine months of this year, they amounted to $544,958,355, as against $471,808,261 for the same period of 1877. Our imports of merchandise reached their maximum in 1873, when they amounted to $624,689,727. For the first

nine months of this year, they amounted to $324,611,722, as compared with $371,314,249, for the like period of 1877.

By this large favorable balance of trade we are very rapidly settling our foreign indebtedness, and the day can not be far distant when we shall begin to absorb the gold and silver of other nations in payment for the merchandise we send them; while, with the extinction of our debt, our taxes will be reduced and our ability to manufacture cheaply will be increased. From Jan. 1st to Sept. 30th of this year, as compared with the corresponding period of 1877, the exports of agricultural implements increased over 50 per cent; of live animals, nearly 150 per cent; books, over 16 per cent; brass manufactures, about 85 per cent; breadstuffs, over 75 per cent; cotton, and its manufactures, over 20 per cent; fancy articles, over 80 per cent; lead, and its manufactures, nearly 875 per cent; provisions, over 17 per cent; tobacco, over 13 per cent; while many articles have lost nothing. Prices have, as a rule, steadily declined during the past year, so that the increase in value represents even a greater percentage of increase in quantity. The iron trade shows a falling off in value, but this is accounted for by a loss in the item of arms greater than the whole falling off in the exports of iron and manufactures of iron. Many articles are not being exported so largely as last year; yet upon the whole our export business is a very healthy one, and in the direction of our most available resources.

During the first nine months of this year, our exports of gold and silver were slightly less than our imports. As we are producing about $100,000,000 of precious metal per annum, we are very rapidly accumulating capital available as a circulating medium; and now that the greenback has reached par in anticipation of the resumption of specie payments by the Treasury of the United States a few weeks hence, it is to be hoped that gold will no longer be simply an article of merchandise, but will be added to the active circulating medium of the country, to be used in the development of the many profitable enterprises requiring it.

There is to-day, perhaps, no more profitable field for the investment of capital in this country than that of gold and silver mining. This fact is already appreciated to a very large extent, and will be still more so as the large returns that capital is now earning become more widely known. Already millions of dollars have been invested in the development of this industry by Eastern capitalists during the past year, and the developments that have been made with the money thus furnished have given employment to thousands at the mines, machine-shops, and establishments devoted to manufacturing mine supplies. There is at the present time no other important industry in this country in so prosperous a condition as this. The important discoveries of rich mines, and the active exploitation of those already known, are greatly adding to our production of the precious metals, and will certainly make our financial condition, in a few years, the strongest of any country in the world.

The abundant harvests of this and last year have also added greatly to our wealth, and though some industries have been conducted with little or no profit during the year, yet there has been, upon the whole, an increased demand, the enlargement of which is a favorable sign for prosperity in the near future.

It is safe to say that the crisis is past, and we are rapidly approaching an era of prosperity unequaled by any in the past history of the country, and it is likely to be more lasting, because it will be upon a sounder basis than heretofore. No other country in the world to-day offers so inviting a field for the investment of capital in productive industry, or so desirable a home to the industrious emigrant.

SAMUEL J. REEVES.

SAMUEL J. REEVES, President of the American Iron and Steel Association, and also President of the Phœnix Iron Company, died at Phœnixville, Pa., on Sunday, December 15th. Mr. REEVES was born at Bridgeton, N. J., in 1818, and was graduated from the College of New Jersey, at Princeton, about 1840. In 1846, he assumed the charge of his father's interests in the Cumberland Nail and Iron Works, at Bridgeton, and in the Phœnix Iron Works, at Phœnixville, and soon became the active manager of the business at both these places. At Phœnixville, the operations were very extensive, embracing the manufacture of nails, rails, and bar and pig-iron. The first rails rolled at the Phœnix Iron Works were made on the 16th of November, 1846. From 1855 to the death of his father, in 1871, Mr. REEVES was the Vice-President of the Phœnix Iron Company, and since then has been its President; being also for a long time the Vice-President of the Cumberland Nail and Iron Works. He was also the virtual head of the rolling-mill, erected in 1848, at Safe Harbor, Pa., and of a blast-furnace erected at the same time. Mr. REEVES was for many years a director of the Cambria Iron Company. In 1862, he invented the Phœnix wrought-iron column. In December, 1849, he participated in the Convention of Iron-masters at Philadelphia. In 1855, he assisted in organizing the American Iron Association, and in revivir g that organization in 1859. The name of the association was changed, in 1864, to the American Iron and Steel Association; and in 1869, Mr. REEVES was elected President, which position he retained to the day of his death.

THE REPORT OF THE DIRECTOR OF THE UNITED STATES MINT.*

DIRECTOR LINDERMAN'S report is a business-like document, almost wholly free from argument, but filled, as usual, with valuable statistics.

The coinage and bars of the year amount to the largest value ever passing through the mint in a similar period of time—$81,120,500 in coins, and $24,356 312 in bars. The Director gives the following table of domestic production, based, as to California, Nevada, Colorado, Montana, and Utah, upon reports made by the express companies and State officials and for other States upon the best available information.

Locality.	Gold.	Silver.	Total.
California	$15,260,679	$2,373,389	$17,634,068
Nevada	19,546,513	28,130,350	47,676,863
Colorado	3,366,404	5,394,940	8,761,346
Montana	2,260,511	1,669,635	3,930,144
Idaho	1,150,000	200,000	1,350,000
Utah	392,000	5,208,000	5,600,000
Arizona	500,000	3,000,000	3,500,000
New Mexico	175,000	500,000	675,000
Oregon	1,000,000	100,000	1,100,000
Washington	300,000	25,000	325,000
Dakota	3,000,000	.....	3,000,000
Lake Superior	.....	100,000	100,000
North Carolina	150,000	.....	150,000
Georgia	100,000	.....	100,000
Other sources	25,000	25,000	50,000
Total for fiscal year	$47,226,107	$46,726,314	$93,952,421

But he remarks that "the aggregate appears to be somewhat below, in gold at least, the actual amount deposited at the mints," without making any allowance for the quantity consumed in manufactures or held by private parties. The Director is, therefore, obliged to add to the gold product of California, "at least $2,500,000, and to that of Colorado $500,000," making the gold product for the year $50,226,107. This is a striking confirmation of the position repeatedly taken by the United States Commissioner of Mining Statistics, for which the statisticians who rely upon express returns alone are accustomed to criticise that officer with more flippancy and severity than justice. When they can not figure on that basis as much gold produced as will equal the portion deposited in the mint, it is time for them to admit, what we have always told them, that there is something the matter with the basis.

With regard to the silver dollars, of which 8,573,500 have been coined, Dr. LINDERMAN speaks in a tone of mild resignation. He alludes to the notorious fact that there has been, in spite of remonetization, a large decline in the market value of silver, and adds: "It will, of course, be readily understood that, as long as the supply of silver is in excess of the demand, there can be no permanent rise in value. An increased demand of any magnitude can only arise for India and China, or in the event of the resumption of the coinage of legal-tender silver coins by France, Belgium, and the Netherlands."

Since the Director penned that sentence, the news has arrived that the mints of the Latin Union will be closed against such coinage for some years to come. In view of this fact, our silver-dollar party, if it retains its notions at all, must make up its mind to advocate a practically monometallic silver standard. Dr. LINDERMAN'S statement is as moderate as words can be; but it means just that. He says: "While this complicated, uncertain, and unsatisfactory condition of affairs with reference to the relative value of gold and silver continues, it will require that the course to be pursued by the United States should be very cautious in respect to the issue of legal-tender coins in which silver is rated so much above the market value, *if gold is to be retained as the principal money of payment and of commerce.*"

With regard to the trade-dollars, the Director says that "if made a legal tender, the purposes of the Act authorizing their coinage would be practically destroyed." And Secretary SHERMAN himself argues forcibly against the proposition to bestow legal-tender quality upon the trade-dollar. It would, of course, be a handsome speculation for somebody, possessing to the extent of the coinage of trade-dollars all the features of "free coinage." If it was advisable to coin this piece for China at all, it is a pity that it did not receive a Chinese name. There have been too many dollars that were not dollars in our recent financial history. *

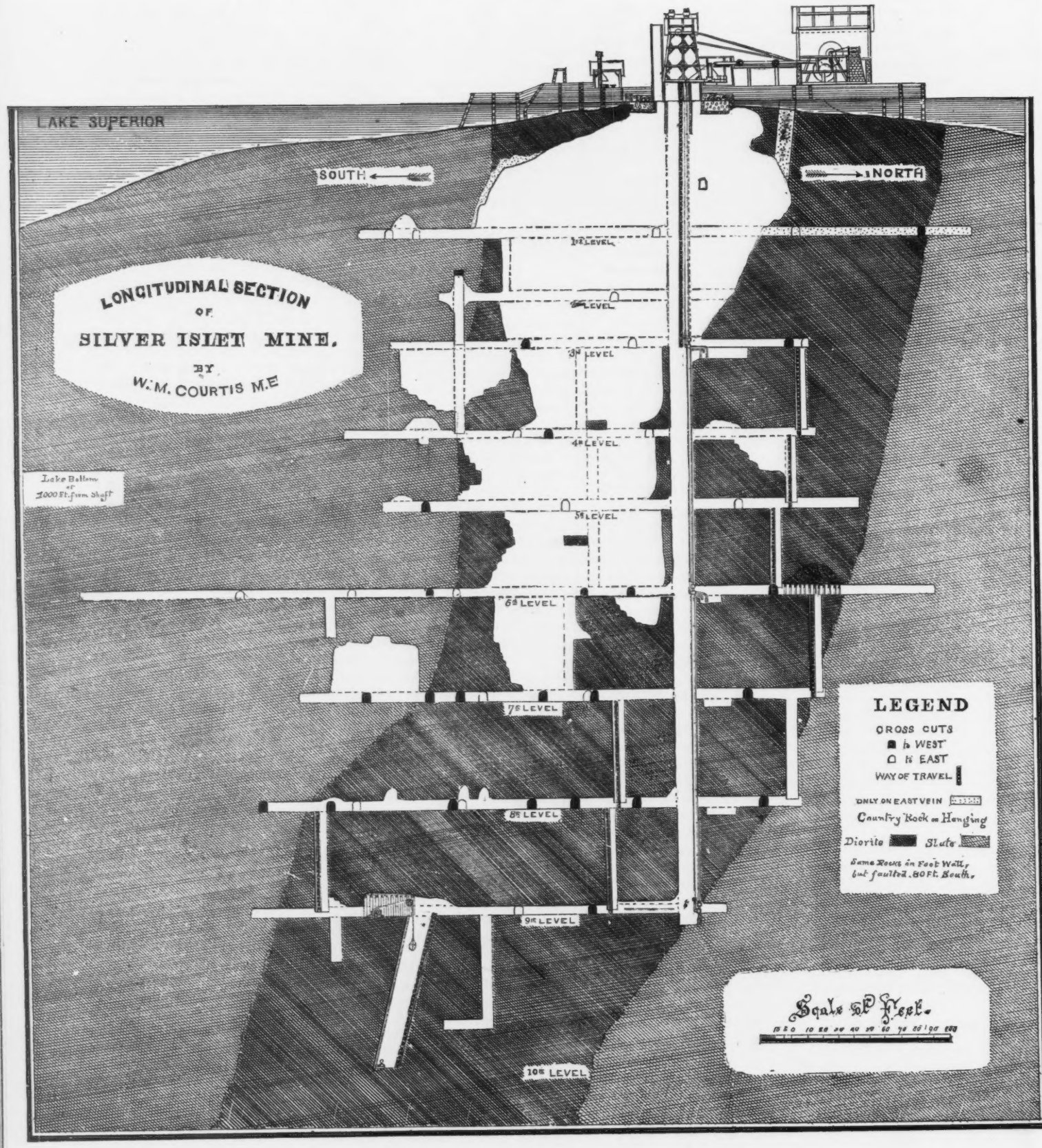
THE ANTHRACITE COAL TRADE REVIEW OF 1878.

According to the Accountant of the Anthracite Board of Control, the shipments from January 1st to December 7th, as compared with corresponding period of 1877 were as follows:

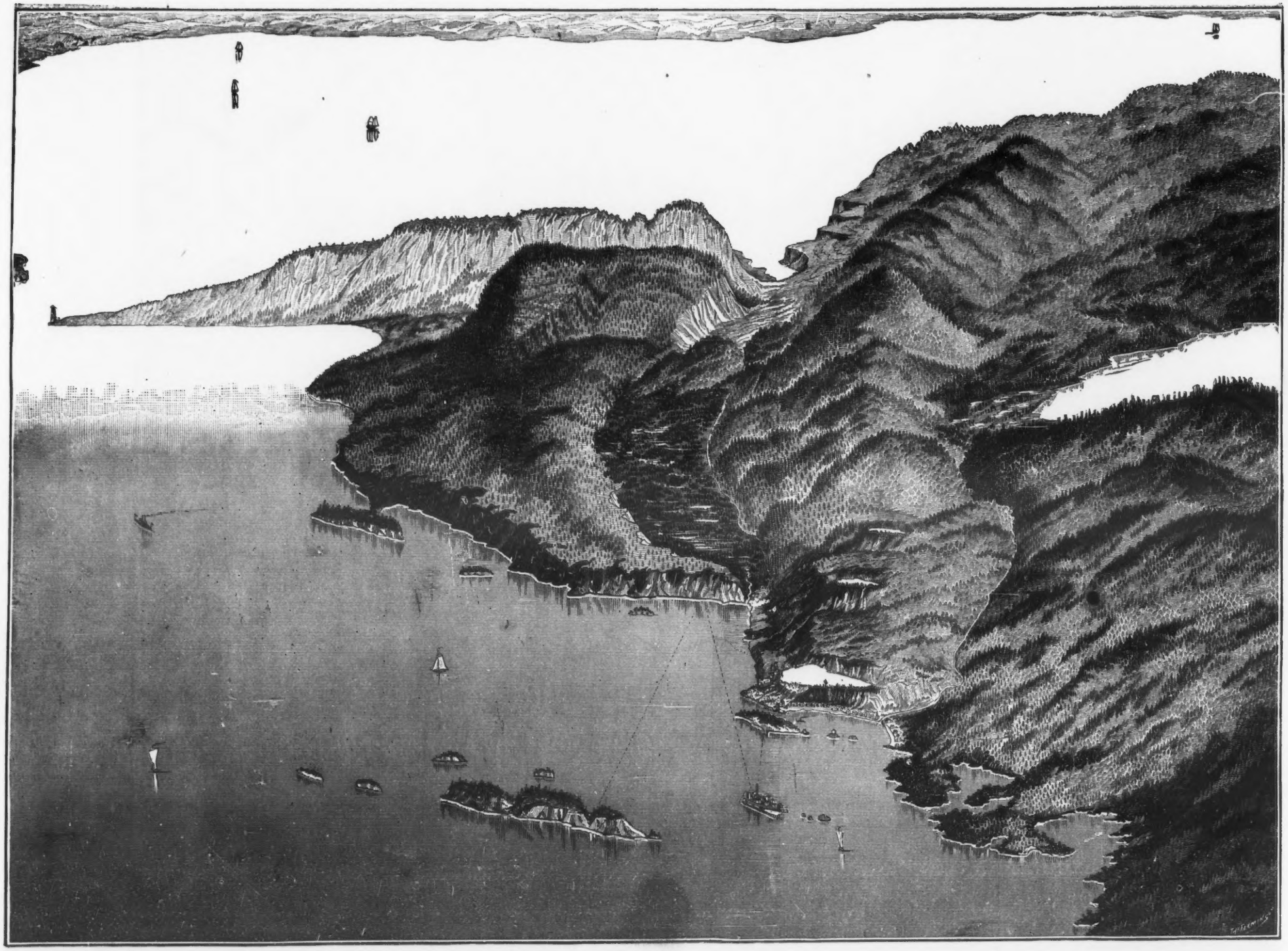
Tons of 2240 lbs.	1878—Tons.	1877—Tons.
Philadelphia and Reading R. R.	4,775,836	6,412,332
Lehigh Valley R. R.	3,222,330	4,196,378
Central R. R. of N. J.	2,065,025	2,570,518
Delaware, Lackawanna, and Western R. R.	2,032,680	1,973,965
Delaware and Hudson Canal	1,890,700	1,782,102
Pennsylvania R. R.	1,281,288	1,446,375
Pennsylvania Coal Co.	908,472	1,032,833
	16,176,331	19,414,503

The above table shows that there has been a falling off in the shipments, so far this year, of 3,238,172 tons. After the formation of the coal combination, early in the year, we predicted that, if the programme adopted were to be carried out, the loss of business this year would probably

*Annual Report of the Director of the Mint to the Secretary of the Treasury for the fiscal year ended June 30, 1878. Washington, 1878.

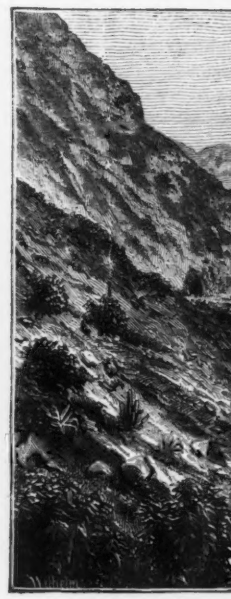


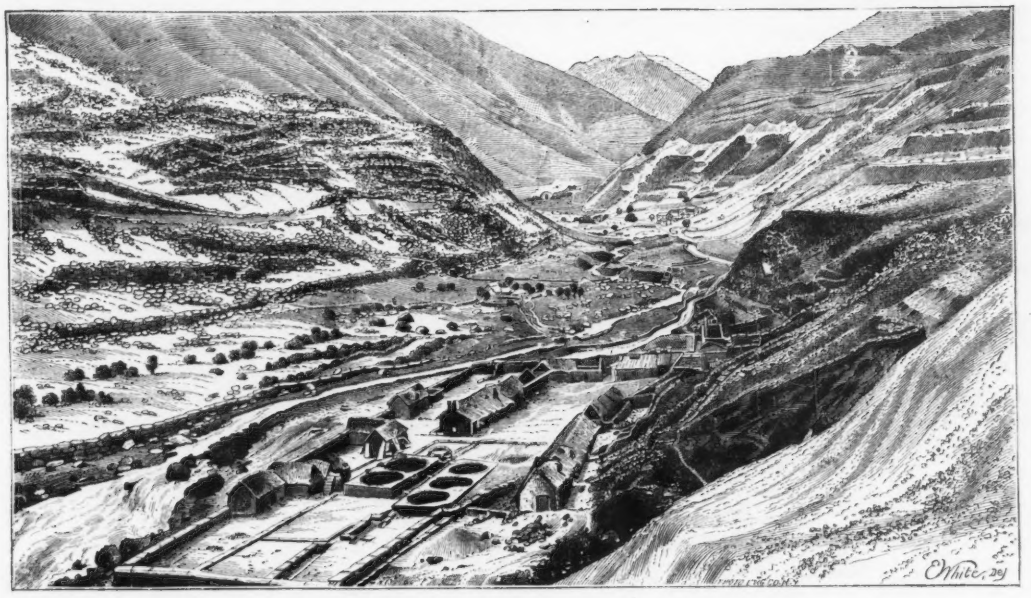
THE SILVER ISLET MINE, LONGITUDINAL SECTION. (SUPPLEMENT NO. 1.)



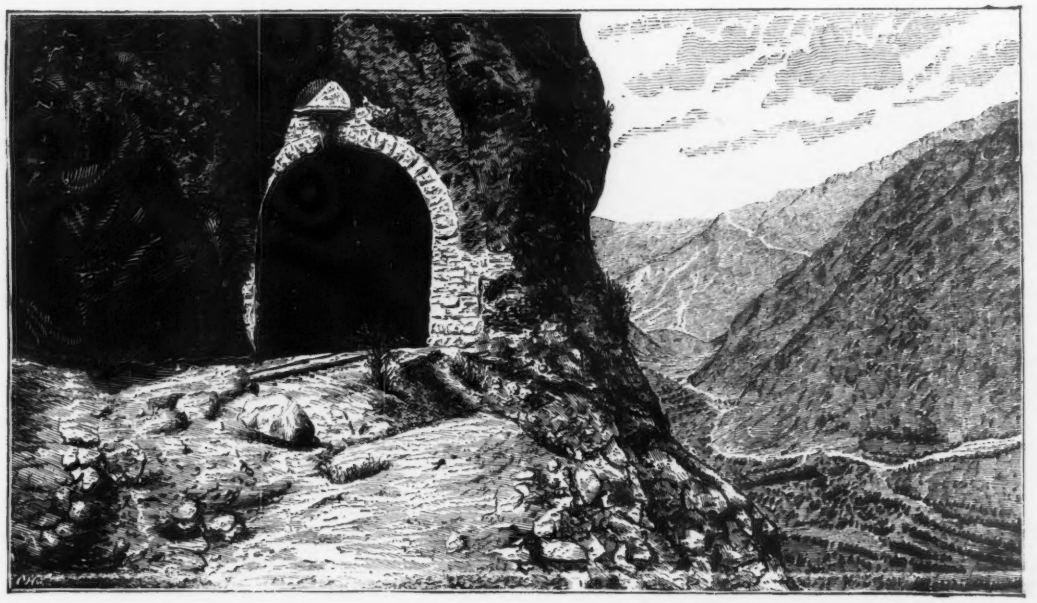
Thunder Cape. Silver Islet.

BIRDS EYE VIEW OF THE SILVER ISLET MINE AND PROPERTY, THUNDER BAY, LAKE SUPERIOR. (SUPPLEMENT No. 2.)



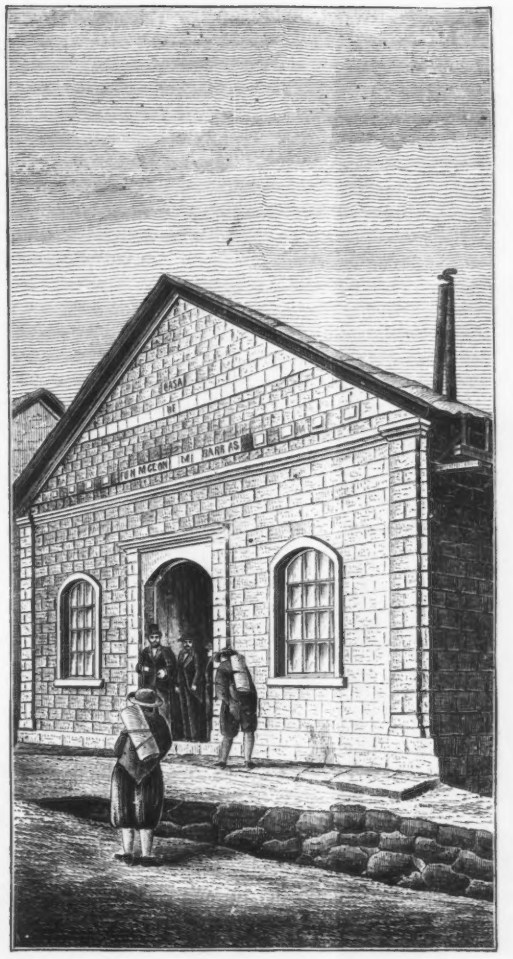


HACIENDA POMA COCHA.—Near Chicla.

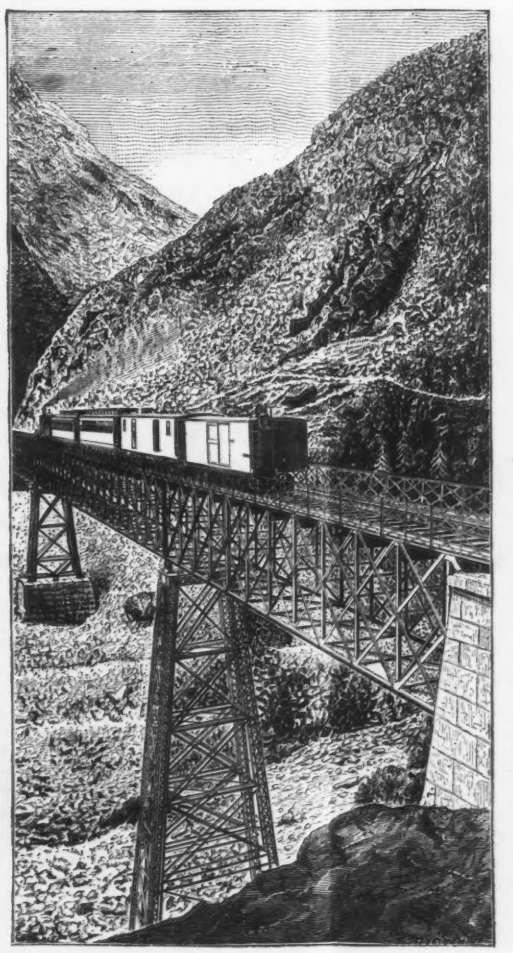


ROAD IN PROCESS OF CONSTRUCTION.—Valley of Rimac, Tunnel 27.

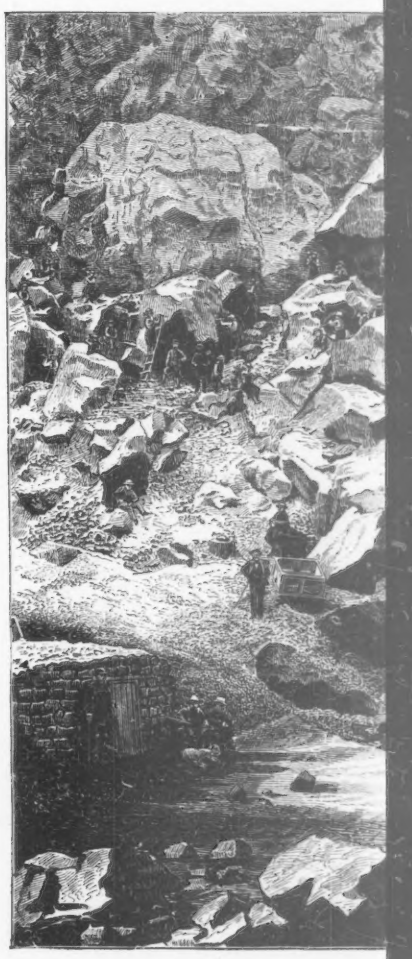
UCUTA.—Bridge near Sacrupe Development.



REFINING HOUSE.—For Inspecting and Working Bullion.



CHALLAPA VIADUCT.



SCENE AT MINES.

NOONING.—Cerro de Pasco Miners Che

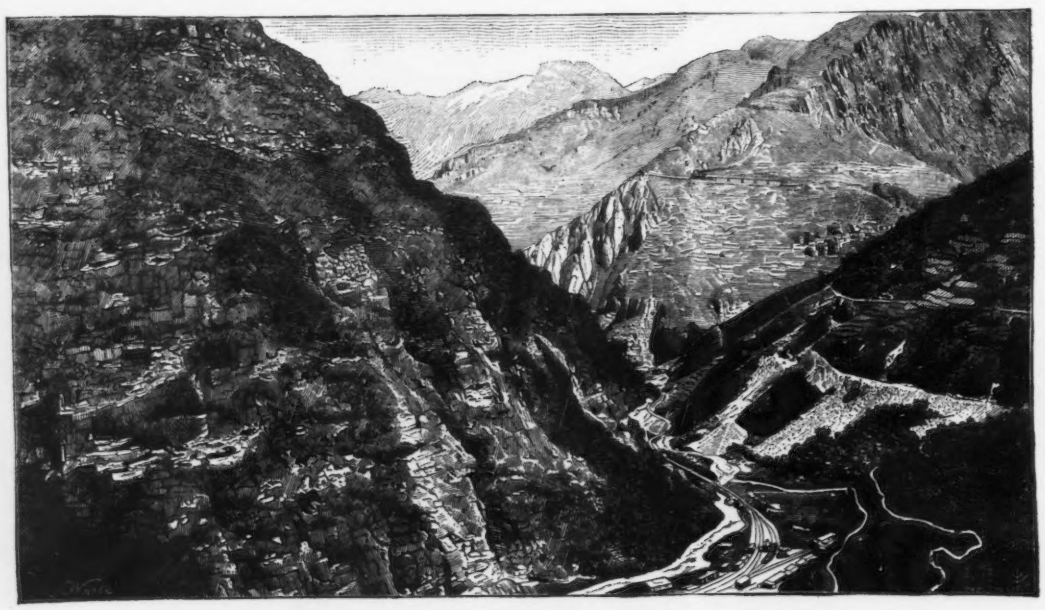
SCENERY ON THE CALLAO, LIMA, AND OROYA RAILWAY, AND VIEWS OF THE CERR

SCENE AT MINES.

CERRO DE PASCO COVERED WITH SNOW.—14,200 feet above Sea-Level.

THE PARAC VALLEY.—Tunnels 22 and 23.

NOONING.—Cerro de Pasco Miners Chewing Coca.



SCENE IN RIO BLANCO.

VIEWS OF THE CERRO DE PASCO MINES. (SUPPLEMENT NO. 3.)

amount to 4,000,000 tons. Had prices been steadily advanced and maintained, as those who entered the combination expected, our prediction would have been more than sustained. By advancing prices, the business was curtailed to such an extent that some of the companies refused to continue this policy further, and expressed much dissatisfaction at the loss of trade. The result has been that since September the coal combination has had but a nominal existence, prices have been secretly reduced, and thereby the markets have been increased. This artificial and unnatural manner of managing a great industry has now again been demonstrated as an injury to the trade, and it is improbable that it will be repeated next year.

NEW PUBLICATIONS.

ANNOUNCEMENT.—The Scientific Publishing Company will forward, postage paid, at publisher's price, any book in the market. Orders will be filled for works in general literature, as well as for those of a scientific character. Address, Scientific Publishing Company, 27 Park Place, New York. P. O. Box 4404.

MINING MACHINERY.—*A Descriptive Treatise on the Machinery, Tools, and other Appliances Used in Mining. By* G. G. ANDRÉ, F.G.S., *Assoc. Inst.*, C.E., *etc.* London and New York: E. & F. N. Spon, 1877 and 1878. 235 pp. quarto, with 182 full-page plates. (2 vols. cloth, $28. For sale by the Scientific Publishing Company.)

This very handsome and useful work, issued in monthly numbers during the past and present year, is, we believe, the first in the English language which covers the whole ground of mining machinery. Other treatises there are, and numerous papers read before professional societies or published in technical journals, which deal with special departments of the subject more fully than it would be practicable to do in a general and comprehensive discussion. In the preparation of a book like the present, we expect from the author or compiler good judgment in the selection of types and illustrations from the abundant material offered by literature and practice, clearness and accuracy in statement, and due proportion in the treatment of different topics. If, in addition, he presents original observations on the merits of machines and systems, or rules by which they may be judged, so much the better. In all these respects, we are glad to say that Mr. ANDRÉ gives reasonable satisfaction. The machines represented in his plates are good, if not the best, of their kind; his remarks upon them are usually intelligent and just; and both text and illustrations leave nothing to be desired in the way of clearness and accuracy. In the departments of deep-boring, direct steam-pumping, winding, rock-breaking, stamp-milling and amalgamating, due regard is given to the excellence of American machines. We notice some omissions, however, which even the lack of space does not fully justify. The diamond drill, for instance, is briefly described under the head of "Exploring Machinery;" but its application in shaft-sinking seems to have been overlooked. Under coal-cutting machines, the best American machine, the "Monitor," is omitted. Under the head of stamps, we find no allusion to the Ball stamp, so successfully used at Lake Superior; and the description of American practice generally, though useful in many ways, is open to some criticism, as confounding the practice of ten years ago with that of the present day. Mr. ANDRÉ has made use, apparently, of the United States reports on mines and mining, which appeared annually from 1867 to 1876, inclusive. But we conjecture that he did not consult a complete set of them, since we fancy that he has made no use of the very thorough paper of Mr. DEETKEN on the Grass Valley mills, published in one of the later volumes, while he adopts descriptions and criticisms on practice in Colorado and elsewhere, which were more timely in 1869 than they are now. Yet a similar criticism might be applied to nearly or quite all works of this class. General text-books are almost always behind the best practice. It requires some years to effect the recognition of the best practice as really the best. And, in the main, Mr. ANDRÉ has made his selections with excellent judgment. We subjoin the table of contents, to give our readers a notion of the scope of the work. The few deficiencies which we have pointed out do not at all diminish its value to American mining engineers, who, in fact, have abundant means of obtaining full details of American machinery, and desire rather to have in convenient form a survey of present foreign apparatus. This they can find in the elegant volumes before us, as the following synopsis shows:

VOL. I. CHAP. I. *Exploring Machinery:* Hand-boring, Machine-boring, Special Systems of Boring. II. *Excavating Machinery:* Hand Rock-boring Tools, Machine Rock-drills, Rock-drill Supports, Air-compressing Machine, Appliances for Firing Blasting Charges, Hand Tools, the Kind-Chaudron Shaft-sinking Machinery, Coal-cutting Machines, Coal-falling Machine. III. *Hauling and Hoisting Machinery:* Tubs or Wagons, Tipping Cradles, Sheaves and Pulleys, Connections, Cages, Keeps, Headgear, Ropes, Horse Whims, Hauling Engines, the Winding Drum, Winding Engines, Man Engines.

VOL. II. CHAP. IV. *Pumping Machinery:* Draining Buckets, Lifting Pump, Force or Plunger Pump; Pumping Engines—the Cornish, the Differential, the Underground, Tangye's "Special," the "Universal," Parker and Weston's, the "Niagara;" Pulsometer, Pumps for Oil Wells, Water-pressure Engines, Water-Wheels, Turbines. V. *Ventilating Machinery:* Bells, Hand-Fans, Fabry's Wheel, Lemielle's Ventilator, Cooke's Ventilator, Guibal's Fan, Schiele's Fan, Root's Blower, Anemometers, Safety-Lamps. V. *Machinery for the Treatment of Mineral Products.* SECTION I. *Crushing Machinery:* Crushers or Rolls, Ore-Breakers, Stamps, Mortars, Screens, Dies, Stamp-Heads; SECTION II. *Machinery for the Preparation of Gold and Silver Ores:* Stamps, the Rittinger Table, Australian Stamps; Wheeler's, Hepburn and Peterson's, Wheeler and Randall's, McCone's, Patton's, Wheeler's Modified, and Horn's Pans; Settlers or Separators, Agitators, General Arrangement of Mills, Collom's Jigging-Machine; SECTION III. *Machinery for the Preparation of Tin, Copper, and Lead Ores:* Jigging-Machines, Cornish Stamps, Husband's Pneumatic Stamps, Buddles, Kieves, Calciners, Sluice Frames, Pulverizers, Copper-ore Dressers, the Frue Vanner.

The plates are distributed as follows: To CHAP. I. (Exploring), 24 plates of boring apparatus, comprising 161 figures; to CHAP. II. (Excavating), 45 plates, with 203 figures, viz.: boring tools, machines, compressors, etc., 24 plates; firing, 3; hand-tools, 2; Kind-Chaudron, 5; coal-cutting machines, 11; to CHAP. III. (Hauling and Hoisting), 48 plates, with 138 figures, viz.: tubs, pulleys, connections, cages, catches, frames, etc., 21 plates; whims, 9; hauling and winding engines, 16; man-engines, 2; to CHAP. IV. (Pumping), 30 plates, with 91 figures, viz.: Cornish pump and engine, 14; horizontal pumping engines, 10; pulsometer, etc., 1; water-wheels, 5; to CHAP. V. (Ventilating), 9 plates, with 20 figures; and to CHAP. VI. (Crushing, etc.), 26 plates, with 78 figures. Total, 182 plates, comprising 691 figures. We think this a pretty fair distribution—if any thing, a little scanty toward the end, and especially in the last chapter, which does not get its full share.

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DIE ENTWICKELUNG DER MECHANISCHEN AUFBEREITUNG, ETC. (*The Development of the Art of the Mechanical Preparation of Ores during the Last Hundred Years.*) By ERNST F. ALTHANS, *Oberbergrath at Breslau. With three plates. Reprinted from the Prussian Zeitschrift für das Berg-, Hütten- und Salinenwesen, etc.* Berlin: Ernst and Korn. 1878.

Councilor ALTHANS was, fortunately for the professions represented by Group I. at the Centennial Exhibition, a member of the jury of that group; and by another piece of good luck or good judgment, the subject of ore-dressing was assigned to him. The treatise upon that subject which he contributed to the "Reports and Awards" is a model of intelligent criticism, and, even as a manual of the art, superior to any thing we possessed in the English language before its appearance. Of that treatise the German version before us is rather more full and clear than the English translation (by a hand unknown to us), given in the official Centennial Reports. Some new matter has been introduced; and some things, obscure in the English version, appear plain in the original. We give a single instance:

Herr ALTHANS says, under the head of "Jigging" (p. 14):

"VON DEM BORNE has already shown that of equal-falling bodies, *i. e.*, such grains of different specific gravity as acquire in a rising stream of water, after the lapse of a certain period the same constant velocity, the *specifically lighter* body must, at the beginning of this period, fall *more rapidly* than the specifically heavier. Now, since in all jiggers a *recurring up-and-down movement* takes place at very brief intervals, and with a very small rise and fall, and since in this process, to secure an effective separation, the ascent of the jigging-stuff must take place by jerks, but the descent by a fall as free and undisturbed as possible, it follows that"—

Down to this point the official translation is substantially the same as we have given; and we have taken pains to quote thus far, only to show clearly how the point of the argument is missed by the translator, in the concluding clauses. ALTHANS continues:

"So dürfen die für einen längeren Zeitraum des Falles giltigen Formeln und Beobachtungen über die *mittleren* Fallgeschwindigkeiten gleichfälliger Körner, welche mit den *constanten Maximal*geschwindigkeiten für die Praxis als gleichbedeutend anzunehmen sind, hier überhaupt *nicht angewendet* werden." The sense is:

—"the formulas and experimental observations which hold good for a longer period of fall, and refer to the *average* falling-velocities of equal-falling grains (to be considered in practice as synonymous with their *constant maximal* velocities) can not be applied here at all."

But the translator, stumbling upon the clause which we have put in parentheses, and referring *welche* to the observations and not to the velocities, renders the whole as follows:

—"no use must be made here of the principles of and observations upon the average falling-velocity of equal-falling grains with a constant maximum velocity, which are true, though for a longer interval of time of fall, and may be considered as synonymous in practice." Which is nonsense.

We should add that we have found the English translation in the main faithful and intelligible; yet it would be well for engineers who read German to possess the German original, in the enlarged form, which now lies before us.

The scope of this essay will appear from a survey of its contents. After a suitable historical introduction, the subject is defined, and the ele-

ments of the discussion are outlined. The following sentence is worthy of note :

"Hand and eye remain for certain tasks, as a rule, the simplest and cheapest means, even in the case of quite low-priced minerals, like coal and iron-ore ; and they become the more indispensable, the richer and more valuable are the ores to be treated, especially for ores rich in silver, the softness of which, and their liability to be reduced by attrition to the finest scales, cause, in the wet treatment of their slimes, most serious losses."

To this is added in the German version, the following interesting foot-note :

"This is true of argentiferous galena also. For experience in the preparation of these ores leads to the conclusion that their contents of silver are inclosed in very fine scales between the foliated laminæ of the galena-crystals, and are mechanically separable from the latter."

The next chapter is devoted to the development of the scientific principles, first of the wet process, and then of the dry or pneumatic process. Under the former head we have, first, the general formulas on which the art of separation by water is based. Councilor ALTHANS gives special credit here to two authors, whose labors have, in his opinion, been valued below their deserts ; and he hints, without openly saying it, that the fame of RITTINGER has unjustly overshadowed and eclipsed them, namely, VON SPAM and VON DEM BORNE. From these authors he takes the formulas for "equal-falling bodies," illustrated by tables and diagrams, and applies them to the different classes of apparatus employed in separation. These he divides into Gravitation Apparatus (settling-tanks and tubs, EVRARD'S coal-washer); Stream-Apparatus (boxes, sluices, etc.); Jiggers, Slime Apparatus and Pneumatic Apparatus. The invention of Mr. STEPHEN R. KROM, with which our readers are familiar, is discussed in a highly favorable tone ; and although the author declines to give a decisive opinion as to the comparative economy of the dry and wet separations, he does not hesitate to pronounce Mr. KROM'S apparatus "an ornament to the Exhibition," and to give him strong praise, as having achieved "an astonishing advance in the art of ore-dressing," by producing mechanical effects, previously unknown and opposed to prevailing theoretical conclusions, and furnishing an ocular demonstration, so clear "that there can be no further doubt of the facts." He suggests that KROM'S system might be effective in the removal of dust from coal, and recommends it with yet greater positiveness for the purification of ground rock-salt from anhydrite.

The next chapter treats of crushers, rollers, grinding-mills, and stamps. Under the latter head there is an interesting description of a stamp-mill built in 1856 by the author for works in Tyrol. We notice that the single-cam form was in this case adopted, and are reminded of the chapter on "The Mettacom Mill," in the U. S. Commissioner's Report of 1870, where this construction is recommended. The Ball stamp of Lake Superior is thoroughly described ; and an interesting table is given, showing the effectiveness of the steam and atmospheric stamps, as compared with the free-fall stamps of California and of Carinthia. The author's conclusion is, that the advantages of heavy stamps consist only in the saving of room and running cost, and in the proportionate reduction of friction in operation. But the achievements of heavy stamps (800 or 900 lbs.) measured by the horse-power developed in their fall, are not greatly better than those of lighter and more rapidly running batteries.

In the succeeding chapter, washing machines (sluices, under-currents, drums, etc.), and sorting-machines (screws, settlers, etc.), are discussed; and the author then passes to the consideration of the important subject of jigging. The improvements effected in jiggers, and the reconstruction of the whole scheme of ore-dressing which has resulted from their more extended application, may be said to have almost revolutionized practice. The continuously-working and adjustable hydraulic jigger has attained within a few years a commanding importance ; and American engineers will receive with gratitude the descriptions and illustrations of the new methods as conducted in Europe, which Councilor ALTHANS here presents.

The KROM pneumatic machine, already discussed in the theoretical part of the treatise, receives a complete description, with plates. We quote the author's concluding comments :

"In comparing the continuous hydraulic jigger with the pneumatic machine of KROM, the very small length of the bed of the latter (five to six inches) appears to be a special advantage, since large quantities of ore may be treated with comparatively small apparatus."

To this he adds, in a foot-note, that the more rapid separation of dry particles in air is due to the smaller adhesion among them—this cause operating in watery pulp to retard the separation and prevent the theoretical principles of the free fall from acting fully in accordance with the formulas. In the same note, he mentions the paper of Mr. J. C. BARTLETT, of Cambridge, published in our columns, in which it is shown that the behavior of small solid spheres in ascending columns of air and of water, according to KROM'S experiments, is dependent upon the small diameter of the glass tubes in which those experiments were conducted.

"But," says Councilor ALTHANS, "it should not be ignored that in pneumatic jigging the equal-falling particles suspended in the air-current are always in narrow spaces, and that in this case the larger particles are under conditions relatively to the neighboring smaller and specifically heavier particles, similar to those which attend KROM'S experiments in glass tubes. In the opinion of the author, therefore, only practical experience can decide whether hydraulic or pneumatic jigging is able to effect a sharper separation according to gravity and size."

His concluding remark is :

"According to late advices, the pneumatic method has already found in the scantily-watered-ore districts of Spain extensive and successful application. At all events, as experience thus far has shown, it offers for such districts, in the mining regions of hot climates, a new technical aid of high importance, permitting the utilization of ores which have hitherto lain unavailable in the earth, or have been thrown on the dump as refuse."

Under the head of Slime-processes, there is a condensed but instructive discussion of buddles, aprons, and shaking-tables. The Frue vanner is mentioned in a foot-note, but not discussed at length ; and a good deal of space is given to RITTINGER'S continuous shaking-table.

A chapter on elevators and other auxiliary machines, and one on general considerations, arrangement of works, etc., conclude this valuable treatise, which, while it does not take the place of the more elaborate manuals of GAETZSCHMANN and RITTINGER, is a worthy companion and supplement to those classic works. *

THE GOLD MINES, SCENERY, AND CLIMATE OF GEORGIA AND THE CAROLINAS. Compiled by R. C. Stone, author of *Gold and Silver Mines of America*. New York : National Bank Note Company. 1878.

This work has been compiled for the Atlanta and Charlotte Air-Line Railway Company, and contains some valuable information for those desiring to learn what has been and is being done in gold mining in Georgia. The work is for gratuitous distribution.

PERSONALS.

The Leadville (Colo.) mines are already in litigation, with fair prospects of the lawyers striking a bonanza and the profits "petering out." Gen. VINTON has been engaged as an expert in certain of these suits.

W. S. KEYES, the accomplished San Francisco mining engineer, has recently returned to San Francisco from a professional visit to Nevada, where he was an expert in a heavy mining suit.

Gen. F. L. VINTON, Mining Engineer of Denver, Colo., has gone to Silver Cliff, to examine some property in that remarkable district. Our readers are promised a description of what he sees illustrated by his skillful pencil.

THE FOREIGN DEMAND FOR AMERICAN ENGINEERS' INSTRUMENTS has greatly increased since the Centennial Exhibition. Heller & Brightly, of Philadelphia, report very large orders from various parts of the world, while Gurley, of Troy, still sends his instruments to the ends of the world.

The electric light in coal mines which produce fire-damp would render explosions well-nigh impossible. It would save many lives by showing the condition of the roof in high chambers, and it would considerably increase the work which men can perform in any mines by giving them abundant light. It would be economical and humane.

The magnificent illustrations of scenery on the Callao, Lima, and Oroya Railway and of the Cerro de Pasco Silver Mines, which accompany this number of the JOURNAL, were all engraved specially for the ENGINEERING AND MINING JOURNAL from photographs, and represent with perfect accuracy the scenes they portray.

The Comstock stocks go down and down, the fact being that the rings controlling them have again squeezed all the money out of the foolish public, that for the hundredth time let itself be tricked by the familiar game. Comstock management has demoralized and impoverished the Pacific Coast, and is a standing disgrace.

The Pacific slope—more particularly San Francisco—is reaping the bitter fruit of the shameless disregard for honesty or fair dealing which has long characterized her mine management, and has made "Comstock management" a shame to all honest people. Thousands of individuals and families have been ruined by this last "squeeze," in order that a few millionaires may increase their ill-gotten stores. If investors generally had heeded the warning so often repeated in these columns, and read the letters of our special correspondent, they would have carefully avoided Sierra Nevada and other Comstocks, when they were "kiting."

The next volume of the ENGINEERING AND MINING JOURNAL will contain a history of the growth of the anthracite mining and the anthracite trade, with beautiful illustrations of geological sections of mines and the different systems of mining ; of machinery of all kinds employed in mining, in breaking and preparing coal ; maps, showing the coal-fields and their routes to market ; profiles showing the grades of the railroads and canals from the coal-fields to tide-water, etc., etc. Also, a mass of information concerning the cost of mining, transporting, and marketing coal, and the prices at which it has been sold since the commencement of the trade, etc.

JACK KEHOE, the leader of the infamous Mollie Maguires, was hanged at Pottsville, Pa., on the 18th inst. He was convicted of killing Langdon, the ticket boss at Audenried, Pa., on June 14th, 1862.

THE CERRO DE PASCO SILVER MINES AND THE CALLAO, LIMA, AND OROYA RAILWAY OF PERU.

(*With Supplements* 3 *to* 8.)

The railroad across the Andes, which is at once the highest in the world and the most difficult piece of railroad engineering that has ever been undertaken, and the fabulously rich Cerro de Pasco Silver Mines, in which fortunes have been made in a single day, are the worthy subjects for illustration in the most beautiful number ever published of a technical paper.

Peru is divided into three portions. "Its eastern portion," according to Dr. Heath, "is nearly an unknown, impenetrable forest, with rosewood, mahogany, calisaya, rubber trees, coffee, cocoa, coca bushes. It is drained by the principal sources of the Amazon. Its center is a double chain of mountains, whose peaks penetrate many thousand feet the eternal frost, separated by a plateau 9000 to 12,000 feet above the sea, which, with the less elevated summits, gives abundant pasturage to herds of cattle, horses, sheep, llamas, alpacas, vicunas, and yields good crops of wheat, rye, oats, barley, and potatoes; and especially rich deposits of silver, copper, iron, quicksilver (cinnabar), coal, zinc, gypsum, and the various nitrates of soda and potash. Its western portion, a gradually ascending plain from the ocean to the base of the mountains, is an almost barren desert from want of water, a depository of petroleum, salt, nitrate of soda, and guano; but when irrigated yields the finest tropical fruits, all kinds of vegetables, with rice, sugar-cane, and coffee, and the cotton and castor-oil plants become perennial trees of twelve to twenty-five feet high, with trunks two to five inches in diameter. While western Peru, rainless, gives 86° maximum temperature for mid-summer, and 58½° minimum for midwinter, eastern Peru gives a tropical heat with rains and vegetation, and its center portion has a climate similar to the United States between the 35th and 40th parallels of latitude. The air coming from the Atlantic passes over Brazil, absorbing the moisture from the mighty Amazon and its tributaries, ascends the Andes, there depositing it in rain, hail, and snow, passes westward one hundred to one hundred and fifty miles, and again falls to the level of the sea. A part then returns eastward over the cool waters of the Pacific, absorbing little moisture, reaches the land, equalizes the temperature, is sucked up the western slope to the summit of the mountains; and, meeting the westward current, is again driven to the sea, thus making the constant southwest wind of Peru and clear weather. The sea at high tide washes up quantities of fine sand on the beach, which dries at low tide and is driven inland by the wind and fills up ravines even to three hundred feet of depth and one mile across, banking up behind every protecting surface, and in its passage over the barren plains accumulates in crescent-shaped, constantly-moving dunes. The shifting sand and barrenness of the country, with the many ravines and uncertain streams, would make the construction of railroads along the coast costly and their maintenance expensive. Formerly one going to the capital (Lima) had to wait the trading visits or go on horseback, a journey long, tedious, and perilous. The only means of traveling was on beasts or on foot, and yet the passage from the coast to the interior with but few exceptions is still the same. Peru wisely appropriated the wealth derived from the sale of her guano and nitrates to opening up her distant provinces."

VIADUCT OVER RIO COPA AND ENTRANCE TO TUNNEL 37.

ENGINEERING DIFFICULTIES ENCOUNTERED IN BUILDING THE RAILROAD.

The engineering difficulties encountered and overcome in building this wonderful road were unexampled. The line follows the cañon of the Rimac River, whose precipitous, sometimes vertical, cliffs rendered it impossible to trace out the line on the surface in many places. A survey and a level line were run up the cañon, and a topographical map, in contour lines 2½ and 5 meters apart, was carefully constructed, on which the general course of the line was projected. The laying out of this line on the surface was a work of extreme difficulty; the rocky sides of the cañon rising at angles of 45° to 75° with the horizon, made it necessary to resort to triangulation in a great number of places to "carry the line" past insurmountable obstacles. It frequently happened that stations had to be made in the face of the cliffs at points reached only in the first place by lowering the engineer over the precipice by a rope, and days and even weeks were spent in blasting out a "footing" for such a station, and in constructing in the face of the cliff a road by which it could be reached. From Matucana to Oroya, the line was surveyed and located under the direction of Mr. Martin Van Brocklin (now Chief Engineer of the Metropolitan Elevated Railroad in this city), to whose skill no small share of the success of this great Trans-Andean line was due.

So difficult was the whole line that at least fifteen miles would have to be located ahead of construction lest some new obstruction should be met with that might render necessary a new location, commencing many miles back on the line. That portion of the line including tunnels Nos. 10, 11, and 12 was so inaccessible that no point on the line could be reached directly, and it was all located by triangulation, and before any work could be commenced, or even a point given for commencing work, a mule-road had to be constructed to get on the ground. These preliminary roads were often more expensive to build than an ordinary railroad, though in some places they were merely ladder-ways bolted on to the side of the cliff.

The triangulation, and, in fact, every part of the work performed by one engineer was invariably "checked" or verified by another before the actual work of construction was commenced; and as a proof of the extraordinary accuracy attained, it may be stated that of the sixty-one tunnels driven, and which were worked from both ends, and not infrequently from drifts—run in at intermediate points, located by triangulation on the face of the cliffs—there was nowhere an error in alignment of more than a few inches.

The base lines for the triangulation were measured with steel rods (Brown & Sharp's U. S. standard), and the instruments, theodolites, transits, levels, etc., were of various makes, at first mostly French and English, but subsequently American instruments were preferred, Gurley, of Troy, N. Y., and Stackpole, of this city, having supplied the greater number.

The elevations of the surface for the contours were determined partly with the level and partly by reducing from vertical angles obtained with the theodolite or transit, the distances being given by stadia measurements. The distances along the main line in difficult portions of the route were determined by triangulation, the stadia being altogether too unreliable and inaccurate, and chaining being impossible from the nature of the ground. The leveling was a work of difficulty and one requiring extreme care, the points being taken wherever a sight could be obtained, zigzagged across the chasm while climbing its almost vertical sides.

The maximum grade permitted under the contracts was 4 per cent, or 211 feet to the mile, on straight line, and 3 per cent, or 158 feet to the mile, on the maximum curvature of 120 meters radius. As the fall in the Rimac considerably exceeds these limits, greater length had to be obtained by running up lateral valleys and by zigzagging up the sides of the cañon. An inspection of the plan and profile on a Supplement page accompanying this, shows a number of "switch-backs," where the line doubles on itself, and in one place where there are five lines of rail—two on one side of the stream and three on the other—one above the other, climbing the mountain; indeed, so closely had the limiting maximum grade been followed that, after adopting all these expedients for gaining length on the fifteen miles from Matucana to Tamboraque, the total elevation overcome is not two meters less than the maximum grade the entire distance would have made.

It was a characteristic of Mr. Meiggs to tolerate no second-class work; even where he was doing the work by contract, every thing had to be built in the best and most substantial manner. The road-bed is excellent. The bridges—a number of which are more than one hundred feet in height, and one, the Verugas viaduct, is 252 feet—are all of iron, and the masonry everywhere of the best character. The stations are very handsome, and the rolling stock as good as on first-class roads in this country. The gauge of the road is the usual American gauge 4′ 8½″.

The beautiful illustrations which accompany this article—see the Supplement sheets—engraved from photographs, show, without any exaggeration, the nature of the ground and the character of the work which characterizes this road as the most remarkable in the whole history of railroad engineering. The country through which the road runs was wholly barren and treeless. Supplies of every kind had to be packed on mules for from one to fifty miles over these indescribable, precipitous mountain paths. Even the old road, which from time immemorial had been the only route across the Andes, is in many places on the edges of dizzy precipices, so narrow as not to allow two animals to pass. Yet every stick of timber and every pound of iron, tools, provisions, coal, grain, and fodder had not only to be transported for many miles on mules and llamas over these aerial paths, but they had to be brought from foreign countries. The grain and provisions were brought from Chili and California; the iron and coal from England. The iron bridges were at first brought from England and France, but subsequently from the United States. The American bridges were preferred chiefly on account of their better and more simple construction, pin connections taking the place, with great advantage, of the riveted structures of European engineers. The machinery and plant were mostly from England, but all rolling stock and shop machinery, as well as most of the more recent bridges all came from the United States. As a rule, where at the commencement of the work nearly every thing came from England or France, of late years nearly every thing came from the United States, and simply because of the fact, established by thorough practical tests, that the American products were superior to those brought from Europe. The timber required in the tunnels, more than one half the whole length of which had to be lined with masonry, all required for houses, for bridges, false works, railroad ties, etc., etc., was brought from Oregon and Califor-

nia. Most of the tunnel timber was in pieces 16 feet long. As many as 600 to 800 cargo mules were in constant work. The Summit tunnel, 3849 feet long, fully three quarters of which had to be lined, and which was situated at a height of 15,568 feet above tide-water level, was under construction all the time while the road up to it was being located and built, so that every thing required in its construction had to be carried on mules at least 50 miles over these mountains, where it snows every month in the year, and where the country yields absolutely no supplies.

The tunnels were all $4{\cdot}20^{m}$ by $5{\cdot}90^{m}$ (say $13' \times 18'$). A heading $6' \times 8'$ being first driven in the top, and the entire crown opened out from that. The lower portion of the tunnel was subsequently worked out in benches. Burleigh rock drills and the Diamond drill were used in the work; the Diamond drill being used for boring ordinary blasting holes. The chief advantage gained by the use of these drills was speed of work. Ordinary labor was paid $1.50 a day, and miners, $2 a day, the men supplying themselves; and, at times, as many as 10,000 men were employed on the work. Of these, rather more than one half were Chinese, and the remainder Chillenos and natives. The Chillenos were the most intelligent and active; but the Chinese, who were working under a contract, and were kept by the Company, were not paid as high wages as the other laborers. On the Summit tunnel, miners from Cerro de Pasco, accustomed to work at that great elevation, were mostly used. A person coming from the low country was for some time incapable of prolonged effort in that rarefied air, where the barometer stands at less than 16 inches.

It needs no more than this brief mention of the nature of the difficulties encountered in building this wonderful road, and a reference to the beautiful engravings accompanying this, and which illustrate the plan and profile of the line and the country through which it passes, to impress every one with the gigantic nature of the work. We are not surprised to learn that the contract price for the 139 miles of road from Callao to Oroya, including equipment, was $27,600,000 in bonds, which, at the time of the contract, were worth nearly par. About 90 miles of the road are now completed and running, and the remainder is under construction.

The service is performed by locomotives, which, with coal and water, weigh about 65 tons, and take up four 10-ton freight cars, though they can take up five of these. From the Summit tunnel there is a down-grade all the way which will carry a light hand-car down at the rate of about 25 miles an hour. Loaded cars would, of course, attain a much greater velocity.

The road was commenced in January, 1870, and this cyclopean work is now practically completed.

THE CERRO DE PASCO SILVER MINES.

From time immemorial Peru has enjoyed the reputation of being the possessor of enormous mineral wealth. Her silver mines were the envy of the world, and brought upon her the invasion of the Spaniards and countless wars, both civil and foreign. The misty legends, which pass for the history of the distant past, refer again and again to the wonderful riches of this silver land, while they relate the glories of the Incas, or rather, of the energetic races that preceded that feeble people; but, after making the most liberal discounts on these fanciful and picturesque stories, the fact still remains that silver deposits, situated in the Cordilleras of the Andes, and of wonderful extent and richness, have been steady and large producers of this metal for many hundreds of years, and are to-day looked upon as probably the richest known deposits of this metal. Of all the Peruvian mines those of Potosi and Cerro de Pasco are the richest, most extensive, and best known. These latter occur at an elevation of about 14,000 feet above tide-water, on a plateau on the eastern side of the western Cordillera of the Andes, and are, therefore, in a most inaccessible position. They possess a somewhat disagreeable though not unhealthy climate. For several months of the year, the climate is fine, the air clear, the thermometer seldom rising above 80° Fahr. At other times, Cerro de Pasco is subject to visitations of snow and rain, and in the winter months of July, August, and September, the temperature during the day averages 44°, and at night 35° Fahr., and sometimes falls below these figures.

DISCOVERY OF THE MINES.

The Cerro de Pasco silver-bearing deposits are said to have been discovered in 1630 by some one unknown to fame, who accidentally melted the metal from the rocks of the neighborhood. From that time on, as the tradition gives it, the mines have been worked with profit, though in the rudest primitive manner. No definite records of the yield of the mines under the ancient Peruvian monarchy exist, but that these and other Peruvian mines were very productive in silver was evident from the vast amount of this metal found by the Spaniards at the time of their conquest, as ornaments of the people, on the tombs of the Inca kings, in the royal repositories and in the temples, that of Cuzco alone containing $11,000,000. It is not unlikely that the Incas, or rather the predecessors of the Incas—a people whose works line five hundred ravines in the twelve hundred miles of Peru, with two hundred and fifty thousand miles of stone walls four to five feet high, ranged in terraces tier above tier in each ravine, and whose other prehistoric works are to-day marvelous monuments to their skill and perseverance—may have been more proficient than their degenerate successors in the arts of mining and metallurgy.

They were, at least, a people so far superior to those who have during the historic period inhabited this country that we are ready to attribute to them knowledge, arts, and riches which possibly they had no rightful claims to.

So productive were these mines that Mr. Castlenau estimated, from all the data within his reach, that the Cerro de Pasco mines, from the date of their discovery in 1630 to 1849, produced about $475,000,000, or an average of $2,170,000 a year. In the year 1852 the rate of production was about $2,000,000 a year, or about one half the entire product of Peru. If we consider the same average amount to have been obtained ever since, though for years the mines were closed, the total production to date has amounted to about $535,000,000.

These misty estimates and legends become a little more definite when we come down to the beginning of the present century, and we learn that during the thirty years from 1790 to 1820 the seven government establishments smelted no less than 101,784,476 ounces of silver from, it is said, Cerro de Pasco ores. The known history of Cerro de Pasco mining operations in the past is easily summed up—the early traditional primitive Peruvian mining; that under Spanish rule; and modern Peruvian intermittent primitive mining. So far as we can judge by the appearance of the mines, the work was never skillful, and it was probably interrupted in the distant, as it has been periodically in the recent past by revolutions, wars, influxes of water, cavings in of ground, etc.: but in all those years the ore has never given out, nor have the mines been stopped because of the insufficiency of this.

NATURE OF THE ORE DEPOSIT.

We have not had access to any report on this remarkable deposit made by authority competent to determine its geological or mineralogical character, but there are certain general phenomena upon which there appears to be no diversity of opinion.

The area covered by mineral-bearing rock is enormous. A single mining depression, or *tajo*, the Santa Rosa, was estimated by Lieut. Herndon in 1852 as 600 yards long by 400 wide and 60 deep. This has been everywhere burrowed out in "gopher holes" from time immemorial, and the quantity of ore which has been taken from it may be judged by the fact that the surface over that area has sunk from its original position about 200 feet vertically, as may be seen by pillars of rock (ore) left standing in the general subsidence, and which are pierced, far above the present surface, by the small drifts of these ancient miners.

This is but one of these immense "cavings" or *tajos* (there are many such), which mark, at the same time, the extent of the ore-deposit and the amount of the precious metal it has produced. That part of the deposit, named by the Peruvians St. Stephen of Lauricocha, is said to be one mile and a half long, and three quarters of a mile wide. No well-defined veins have been found, though some engineers have supposed them to exist; the entire mass of rock is silver-bearing, though not uniformly so. Even the mud with which the wretched adobe houses of the straggling, irregular town are built is said to assay from $5 to $10 per ton, and the average of the ore taken out from the hundreds of small mines which exploit this bonanza yields, by the Patio process, which is now in universal use, from $20 to $60 per ton. Numbers of assays made on the rock in all parts of the deposit make it probable that the whole of this enormous mass of mineralized rock will run $30 to $40 per ton. Near the surface, that is to say, till the water-level is reached, at some 300 feet below the general present surface, the rock is decomposed and iron-stained, resembling the iron gossan of a large lode, and it is in this material that almost all the mining has been carried on. Below the drainage level of the tunnels the ore becomes pyritic, and as the natives have never understood the treatment of sulphurets, this zone has practically limited their works in depth.

METHODS OF MINING.

The mining claims are held under the old Spanish law—modified by local custom—which allowed an area of 30×60 varas, or nearly 90×180 feet.

The Spanish law limits every claim by vertical planes through its end and side lines; but as the mines were never surveyed, and the workings were very irregular, but little effort was made to confine the underground operations to these restricted limits. Each owner opens his mine on his own ground; beyond that little can be said. The mine is opened by an incline, having an inclination of 20° to 30°, cut in steps like a stairway; this winds about in its downward course, and from it small drifts are run out, more or less horizontally, wherever the ore gives appearance of sufficient richness. When a good ore-pocket is met with, it is excavated, leaving a large, irregular chamber. As timber is wholly wanting in the vicinity of the mines, none is used in the underground workings; and as no system is attempted in laying out the work, but each mines according to his own sweet will, it is not surprising to hear that "cavings" of the ground frequently occur; in one of these some 300 men were buried.

The ore is generally easily mined and is broken down with the pick and bar, though powder is also used when the rock is hard. The ore is filled into raw-hide sacks, and is carried up the inclined stairway to the surface on the backs of men. As the mines attained depth, the difficulties from influxes of water greatly increased. In 1780 the adit or *socabon* of San Judas was commenced. It was $5\frac{1}{2}'$ wide, by $6'$ $10''$ high, and is about 3500 feet long. It was finished in 1800, and cost $100,000. The mines that were working below this level pumped the water up to that by hand; but as this was found quite insufficient, a larger adit $6'$ $10'' \times 6'$ $3''$ was driven 88 feet below that of San Judas. This is arched in good masonry through a great part of its length, which was 8250 feet, and taps the mines at a depth of about 300 feet. These tunnels are not driven straight, but are directed first toward one mine and then toward another. They are through the greater part of their length in ore. Rivero, who drove this lower tunnel 122 feet, between June 1st, 1827, and January 1st, 1828, gives the cost of that part of the work at $85 per yard (vara). In 1852 the total expenditure had amounted to about $1,000,000.

Steam pumping-engines were at various times established at these mines; but, as they had to be cast in pieces, even to the steam-cylinders, and had to be carried over the mountains on mules and llamas, they were necessarily very expensive; moreover, though in the deeper workings that they rendered possible some very rich ore was found, yet this was generally a sulphuret unsuited, without roasting, either to smelting in the primitive furnaces of that country or to amalgamation by the Patio process; hence, steam-engines have not become popular. The majority of mine-owners work altogether above the level of the great tunnel, and are unwilling to pay the tax or royalty accorded to the pumping company for draining ground they claim they do not want to use. Local jealousies also entered largely into the question till the result always was disastrous to those who ventured to introduce this improvement at the mines.

THE PRESENT AND FUTURE OF THE MINES.

This was the condition of affairs in 1869, when the Peruvian government, after an examination of the Cerro de Pasco mine by a commission, recognized its value as equal in all respects to that of the famous Potosi, and its active development as a question of national importance, and accordingly made contracts with Henry Meiggs for the construction of the Trans-Andean railway and of a branch to connect this with the mines. A contract was also made for driving a deep adit to drain the mines. This has been under construction since October, 1877. It is 64 varas deeper than that now draining the mines, or over 400 feet below the surface, and it will have a length of 2600 meters, about one half of which will, it is expected, be in ore-bearing ground.

The arrangement made with Mr. Meiggs was a very favorable one. The ore-bearing portion of the Cerra de Pasco district, belonging to the Peruvian government, was ceded absolutely by it to Mr. Meiggs, and persons owning and working claims in that district were allowed the option of continuing their work and paying Mr. Meiggs 30 per cent of the ore taken out, or relinquishing their claims to him and receiving 20 per cent royalty. There were 53 legal claims of 100 meters by 300 meters, and nearly all of the owners preferred to give them up to Mr. Meiggs and receive 20 per cent of the ore extracted. The death of Mr. Meiggs last year did not interfere with this arrangement, as the contract held good with any persons who might succeed him.

The government also turned over to Mr. Meiggs two heavy Cornish pumping-engines and the narrow-gauge (3′ 6″) mineral railway, with its equipment.

This railway was completed in 1873. It was built partly by English and partly by government capital, at a cost of $1,200,000, is seven miles in length, and without doubt is the highest railway in the world, Cerro de Pasco being 14,200 feet above sea-level; the other terminus (Sacra Familia), 13,700 feet. The object of the road is to carry ores from the mines to water-power.

The equipment, rails, etc., were brought from the coast, nearly 200 miles, on the backs of mules, over roads that a stranger would wonder how any thing without wings could pass. Nothing weighing over 300 lbs. could be transported; even the cylinders of the locomotives were brought in sections. One 50 and two 80-foot span iron bridges were brought in the same manner. The rails are 6 feet long, and weigh 45 lbs. per yard. In connection with the road are all necessary shops and machinery for making repairs. A foundry is being erected for making heavy castings.

Mr. William H. Cilley, the engineer to whose skill much of the success in building the Trans-Andean railway is due, and who was a trusted adviser of Mr. Meiggs, visited the United States early in the present year, and, after a careful study of the latest and most successful mining and milling machinery, ordered an 80-stamp mill, with all its appliances of the latest and best construction. This mill is now being erected near the mines, and will soon be ready to commence stamping out dividends from the abundant ore at hand. An immense amount—valued at from $250,000,000 to $500,000,000—of free-milling ores will be left above drainage level by the new tunnel, and it is proposed to have these ores excavated (by a steam shovel in most places) as an open-cut or quarry, and loaded directly on railway trucks, which deliver them at the top of the mill. The views of the mine which we give herewith on Supplement sheets show the enormous scale upon which this exploitation may be carried out; indeed, those familiar with the ore deposit and the conditions under which work will be carried on do not hesitate to say that the output of ore may come up to almost any figure, and 20,000 tons a day is mentioned as a possible amount. As the ore contains an average of say $30 to the ton, and the expense of milling will be very light, it requires but little "figuring" to satisfy any one that the profits will soon run up into the millions.

Enrique Meiggs

As the entire rock of this deposit is good milling ore and as arrangements will no doubt be completed to allow the mining company to work all the claims in the district, there may eventually be a production sufficient to keep many hundred or even thousand heads of stamps running continuously.

THE MILL.

The mill, of which we give beautiful plan and section views on Supplement sheets, is of the most improved modern type, such as is now made by several well-known firms in this country. There are 80 heads of stamps, and it is estimated that they will crush 5 tons of ore to the head per day, or a total of 400 tons a day.

It is the intention to erect other and larger mills as soon as this is doing satisfactory work; 200 or 300 heads of stamps are looked forward to as a small number at an early day in the works of this progressive concern—unless, indeed, some better and more economical method of crushing ore should be found.

Connected with the works is an extensive and very completely-appointed testing laboratory, where any process that gives fair indications of success in effecting an economy upon those now in use, will get a fair working trial. This judicious plan of operations will keep the company in the foreground of the most improved practice, and at the same time will avoid the expensive and often disastrous results which follow the adoption, on a large scale, of insufficiently tested "new processes."

The mill gets its power from a large stream of water, coming from a lake near the mines, said to be sufficient to run steadily more than 1000 head of stamps and their necessary accompaniments. This water-power is utilized by six double turbine water-wheels, manufactured by James Leffel & Co., Springfield, Ohio, and shipped by Mr. Charles M. Fletcher, of this city. Four of these turbines are of thirty inches diameter, each developing two hundred horse-power, and two of twenty-three inches diameter, developing one hundred horse-power each. The turbines are placed vertically, with the shafts in a horizontal position, and the main driving-pulleys on a continuation of the turbine shaft.

Every thing connected with the appointments of this great mining enterprise has received the most careful personal attention of Mr. William H. Cilley, whose experience, sound judgment, and progressive ideas are everywhere shown by the practical utility of the innovations adopted.

The energetic exploitation of this enormous ore-body, whose persistence and richness in depth have been fully tested by the diamond drill, will certainly have an important bearing on the commerce, not only of Peru, but of the entire world. Bewildering as that amount must appear, there seems to be nothing impossible in the actual production of $100,000,000 a year from this remarkable property. The ore is tested and proved in the most thorough manner by centuries of work; it can be mined at a scarcely greater cost than earth excavation in a railroad thorough cut. This work will be be done principally by steam-shovels, and the deposit is accessible by ordinary railroad to a great depth and over an enormous area. Wages, with the facilities the great Trans-Andean railway afford, will be low, and there seems nothing impossible in the supposition that ore can be mined and milled for less than two dollars ($2) per ton. Are we not now mining and milling a much harder ore at the Findley and some other gold mines in Georgia for less than fifty cents a ton? The tests of centuries of work have shown the ore to yield, by the Patio process, from $30 to $40 per ton, which is quite as high as the average of Comstock ores, and the mines to have produced from the little "gopher holes" of the ignorant and indolent natives more than $500,000,000 in silver. Every thing points to the conclusion that we have in this enormous project of Henry Meiggs an enterprise that makes the millions of the Comstock bonanzas appear insignificant, and that threatens the world with such an abundance of silver as would more than satisfy the wildest and most enthusiastic advocate of a silver currency.

HENRY MEIGGS.

This description of the wonderful Peruvian railway, and of the grand plans for the exploitation of the Cerro de Pasco mines, would be incomplete without some sketch of the remarkable man whose genius and enterprise gave them birth.

Henry Meiggs was born in Catskill, N. Y., in 1811. He began business as a contractor in Boston, removed thence to New York, where he made a fortune in the lumber business, but lost it in the crisis of 1837. In 1848, at the breaking out of the gold fever, he sailed with a cargo of lumber for San Francisco, and sold the cargo for twenty times its cost. He then established large saw-mills on the bay, and did an enormous business up to 1854, when he failed in the panic of that year. He was next heard of as a railroad-bridge contractor in Chili, and in 1858 he contracted with the Chilian government to complete the Valparaiso and Santiago Railroad in four years for $12,000,000; but he finished it in two years, making a net profit of $1,326,000. He next took large railroad contracts in Peru and made enormous profits, and in 1869 he contracted to build the Callao, Lima, and Oroya and some other roads at a price of $125,000,000. He subsequently made arrangements with the government for draining and working the Cerro de Pasco mines, and was engaged in these several enterprises and many others at the time of his death last year.

This brief sketch of the enterprises conducted by Mr. Meiggs is sufficient to mark him as a man of wonderful ability and elasticity. He was, in truth, a very remarkable man; his ideas and plans were always on a grand scale; he thought in millions; and, though not a professional engineer, he was full of resources, and had marvelous skill in overcoming difficulties. Even where his personal interests were directly concerned as a contractor, he would never permit any thing but thorough, first-class work to be done. There was never any thing contracted in the man. No

wonder, then, that his acquaintances soon became his most enthusiastic admirers.

Das „Engineering and Mining Journal" für 1879.

Am ersten Januar, 1879, beginnt das "Engineering and Mining Journal" seinen siebenundzwanzigsten Jahrgang, und mit verzeihlichem Stolz können wir constatiren, daß es während diesem Zeitraum seine Stellung als das einflußreichste und weitverbreitetste Journal über Bergbau in Amerika behauptet hat. Während der letzten 5 Jahre hat es zwei wichtige Fachblätter, den "Coal and Iron Record" von New York und die "Mining Review" von Denver, Colorado, mit sich verschmolzen und so den vereinigten Subscriptionslisten eine bedeutende Zunahme ermöglicht. Gegenwärtig ist seine Circulation vielmal größer als die irgend einer andern Bergbau-Zeitung in Amerika.

Der Zweck des Journals ist, eine mehr ökonomische Produktion der nützlichen Mineralien, Metalle, und deren Erzeugnissen zu veranlassen, so wie für die bessere Lage der in diesen Industriezweigen Beschäftigten zu sorgen.

Zur Erreichung dieser Ziele streben wir nach einer Verbindung der gründlichsten technischen Information für den wissenschaftlich gebildeten Ingenieur und Metallurgen, mit der Elementar-Wissenschaft und Anleitung über die praktische Anwendung dessen, was für Alle, die in thätiger Ausnutzung dieser Industrien betheiligt sind, sei es als Arbeiter, Vormänner, Aufseher, Broker, Händler, oder Capitalisten, von Interesse und Werth ist. Wir wollen das Journal praktisch, werthvoll, populär und interessant für Alle diese machen, ohne die Genauigkeit der Sensationssucht zu opfern, ohne Concessionen für Steckenpferde, groteske Theorien, oder Münchhausiaden, welche schroff als „Wissenschaft" oder „wichtige Anleitung über Bergbau" figuriren. Seine technische und wissenschaftliche Information kommt von den höchsten Authoritäten in jedem Departement, und soll immer praktischen Werth haben. Seine Mittheilungen über Finanzwesen und Handel stammen aus den zuverlässigsten Quellen, fern von jedem persönlichen oder speciellen Interesse. Es will ein durchaus unabhängiger und sicherer Geschäftsanleiter für Arbeiter und Kapitalisten sein, und das hohe Vertrauen, das es genießt, sowie sein großer Einfluß in Finanz- und Handelskreisen, sind der beste Beweis für den Erfolg dieses Strebens.

Es enthält in Wort und Bild jedes Bergbausystem für Kohlen und Erz; Bau- und Mahlmaschinen jeder Art; Oefen und Angaben zur Gewinnung und Verarbeitung der Metalle. Für Gasbereitung (vorzugsweise Brenngas) und elektrisches Licht ist ein bestimmter Raum reservirt. Jedes Land und jede Sprache müssen zu der Wissenschaft, welche obige Ziele fördert, und die Wohlfahrt des Landes unterstützt, beitragen.

Ebenso wird beständig darauf gehalten, daß das Journal für Arbeiter und Ingenieure gleich interessant und werthvoll ist. Man findet darin Spezial-Correspondenzen aus den Bergbau-Regionen von ganz Amerika. Auch die Zusammenstellung der Arbeitsnotizen, enthaltend Lohnsätze in jedem Theile der Welt, Fortschritte in Bezug auf Cooperation, Schiedsgerichte und andere Mittel zur Verbesserung der arbeitenden Klassen, finden stets besondere Berücksichtigung.

Redlichkeit, Gerechtigkeit und Nachsicht verhindern am Besten Arbeitseinstellungen, und die Annahme von Mitteln zur Besserstellung der Arbeiter, sowohl in Bezug auf erhöhten Nutzen ihres Verdienstes, als auch auf Verringerung der Kosten des Lebensunterhaltes sind für Arbeitgeber und Arbeiter gleich wichtig.

Das *Engineering and Mining Journal* wird ein beständiges Interesse für Kapitalanlagen im legitimen Bergbau zu fördern bemüht sein, dabei stets die Grundsätze der Klugheit und geschäftlichen Umsicht befürworten, sowie Ehrlichkeit und Erfahrung bei der technischen und finanzeellen Verwaltung von Minen und Minengesellschaften als Grundbedingung für vortheilhafte Kapitalanlagen betonen.

Das *Engineering and Mining Journal* hat keine hemmenden Verpflichtungen. Es wird weder durch ein bestimmtes Interesse controllirt, noch ist es das Organ einer „Gesellschaft" oder Clique. Es hat stets unehrenhafte Geschäftskniffe rücksichtslos bloßgestellt, mögen dieselben durch den Glanz von Millionen vergoldet sein, oder auf sogenannten „zehn Cents-Spekulationen" in Schwindelminen (wild cat) beruhen.

In der festen Ueberzeugung, daß vorsichtig in Minen angelegte und ehrlich verwaltete Kapitalien den größtmöglichsten Nutzen bringen, und gestützt auf die Thatsache, daß die Minen unseres Landes die der ganzen Welt an Reichthum übertreffen, sind wir die eifrigsten Vertreter dieser Grundsätze, welche die Basis der wichtigsten Industrie bilden, welche dieses Land besitzt.

Prizes for Inventions.—Among the subjects for which the French Société d'Encouragement offers prizes are the following: Small motor for domestic workshop; improvement in manufacture of flax and hemp; deadening of shocks caused by block hammers; heckling short textile fibers; instruments of automatic topography (3000f.); file-cutting machine; improvement of steam-engine; new alloy useful in the arts; artificial manufacture of graphite for crayons; manufacture of black diamonds; industrial use of oxygenated water; theory of steel, based on precise experiments (6000f.); rendering tissues and wood uninflammable; sulphuric acid without arsenic, extracted from pyrites; chemical transformation, giving a useful natural product (4000f.); cast-steel or iron, improved by alloy with another metal (3000f.); economical preparation and use of ozone; fixation of nitrogen of the air in nitrates, cyanides, or ammoniacal salts; artificial production of fatty bodies (4000f.); disinfection of gas-purifying cases; permanent disinfection of water-closets (2000f.); rapid desiccation of wood; means of preventing the adherence of soot in chimneys; food preservation; application of spectrum analysis in industry; small apparatus giving high temperatures; application of the endosmose of liquids and of gases; destruction of centers of attack of phylloxera; utilization of land by fruit-trees; distribution of pulverulent manures; employment of photography for typography. The awards are to be made at sundry dates between now and 1882.

SILVER ISLET MINE, LAKE SUPERIOR.

(*With Supplements* 1 *and* 2.)

Having visited the office of the Silver Islet Company, and examined the remarkable exhibit of silver to be seen there, we were curious to gather for our readers reliable information as to its past, present, and probable future, and from the information obtained we have collated the more prominent and interesting facts and features.

The Islet but a few years since was a mere hummock on a submerged reef running parallel with the Canadian or north shore of Lake Superior, and about four fifths of a mile distant from the main-land.

Two veins of calcite, mingled with native silver, crossed the island in a northwesterly direction, and were distinctly traceable on the main-land for a long distance, although not showing silver on the surface.

The country bears evidence of violent disturbance, and is traversed in an easterly and westerly direction with numerous dikes of trap-rock, styled diorite, the intervening space being occupied by gray and red sandstone, having an inclination or dip to the southeast. In the rear of the location, and bordering upon Thunder Bay, rises abruptly the headland of Thunder Cape to the height of 1400 feet, similar in appearance to, though more magnificent in form and size than, the palisades of the Hudson. A break in this upheaval of about one mile in length on the direct course of the Silver Islet vein, yet transversely to it, induced the proprietors to acquire all the land lying between their property and Thunder Bay, under the conviction that their Silver Islet and other known veins passed through this break.

It is unnecessary to detail the difficulties and dangers which were encountered in establishing a permanent foothold on the Islet, as they must be obvious to every one who appreciates its exposed position and the tempestuous character of Lake Superior. It is sufficient to say that they were successfully surmounted, and the mere speck of obtruding rock of 70 by 80 feet has become a permanent crib-work island of nearly five acres, upon which have been constructed all necessary buildings and appliances to carry on the development of the mine.

It was fortunate for the proprietors that the exposure at the Islet proved to be the outcrop of an immense bonanza, from the proceeds of which they were enabled not only to reimburse their cash advances, to pay arrearages of purchase money, to provide for construction and development, but also to distribute as profits about $700,000.

The mine has never been flooded, nor has the vein ever been lost, as the public, by rumor, had frequently been erroneously informed. The maximum quantity of water required to be pumped is only about five barrels, or say 160 gals., per minute, being far within the capacity of the engine and apparatus in use; and the true fissure character of the vein has already been proven to a depth of one thousand feet. The vein varies in width from four to thirty feet, and is so nearly vertical as to render timbering for supporting purposes practically needless.

The ore, as it is brought to the surface, is selected; the richer, styled "packing ore," being barreled and shipped direct to the smelting works in New York City, the balance being transported to the company's fifty-stamp mill on the main-land, where it is crushed, and by a system of vanning it is so concentrated that the silver scattered through forty tons is concentrated into a single ton, with very inconsiderable loss, when the concentrations are also forwarded to smelting works.

The ownership of the mine is largely in the same parties who were original purchasers of it, and of about 100,000 acres of other mineral lands bought in the fall of 1870 from the Montreal Mining Company. This property, which, in extent, is about equal to five times the area of Manhattan Island, is held by indisputable title from the government of Canada by the Silver Islet Consolidated Mining and Lands Company, having a capital stock of one million of dollars, divided into forty thousand shares. Its bonded debt, now reduced to $320,000, is being paid off as rapidly as the silver rock can be smelted, the supply on hand being largely in excess of the requirements for such purpose.

The mine is thoroughly supplied with every thing requisite, and gives evidence from its various openings of a most abundant yield of silver from the Islet alone, without reckoning upon the product confidently expected from the workings on the main-land, or from the other locations belonging to the company, on which explorations already undertaken will be vigorously pushed next season.

From the accompanying illustrations of the underground workings, and view of the Silver Islet location, an idea may be formed of the property. Its great prospective value can be appreciated when it is taken into account that the vein is a "true fissure," the ore of unprecedented richness, and all the elements of cost more favorable than in any other silver-mining district in the country.

We are informed that in addition to the $2,500,000 realized previous to the formation of the present company, there have been mined and received nearly $800,000 worth of mineral during the season just closed, the greater portion of which has been taken from the new bonanza since August last.

This bonanza, which is located just south of the original one, largely exceeds it in richness, the packing ore ranging from $1500 to $6000 per ton, with large quantities of nearly pure metallic silver, and also an ore of silver yielding 60 per cent. As to its magnitude, it is impossible to say any thing further than that all appearances indicate its continuance.

The product of the stamp-mill since July has been equally satisfactory, averaging over $8000 per week. The mine is reported as abounding in stamp-rock, both in the stopes and adits, and it is to be regretted that the impracticability of transporting this rock during winter from the Islet to the mill (which is on the main-land) has compelled the stoppage of the mill until spring. A recurrence of this evil will be avoided in future by an accumulation of rock at the mill during the summer months.

It is proposed, during the winter, to push forward the opening of the mine at all points where it is known to be silver-producing, both north and south of the shaft, and also at the bottom or tenth level, and it is expected that there will thereby be produced a sufficiency of ore, which, added to the present surplus here, over every indebtedness, will furnish an ample reserve to provide for all future purposes or contingencies, so that the entire production next year may be currently distributed in dividends, as received and smelted. The policy of the company is to establish its business upon a sound and legitimate basis, and, admonished by former

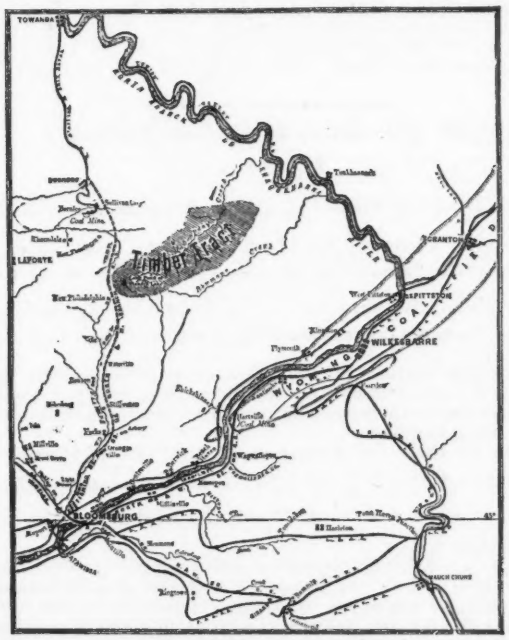
experience, to hold the declaration of dividends surbordinate to that policy. It is certainly a matter for sincere congratulation to find a company which has, after the many trials and reverses which mining is subject to, now fairly landed on the solid foundations of success which a wonderfully rich mine and a sound and honest policy insure.

THE TIMBER, OCHER, AND IRON ORE OF NORTH MOUNTAIN, PA.

The enormous consumption of timber in the older parts of the country, and especially in the mining regions, has caused our great forests to disappear like the dew before the rising sun, and it is now uncommon to find anywhere in "the East" a tract of even a few thousand acres of virgin forest. As the timber disappeared it became correspondingly more valuable, till at the present time two, three, and even four dollars per 1000 feet (board measure) "on the stump" is no uncommon price to pay for pine, while some of the timber now used at the anthracite mines of Pennsylvania is brought from Georgia and other distant points.

The great plateau of North Mountain, a spur of the Alleghanies, though it lies near the Wyoming coal-field, and has long been known as quite accessible through the Mahoopany, Bowman's, and other creeks that empty into the Susquehanna, was up to a few years ago held in such a manner that it was not available for lumbering purposes and too inaccessible to make its minerals of value; but through the efforts of some gentlemen who held interests there, a compact body of land, comprising some 40,000 acres of the very finest virgin forest and of high value for its minerals, is now available for active development.

This magnificent property, with which we are personally acquainted, has great intrinsic value. Its hemlock timber is probably unequaled



in any part of this country, and though this, for building purposes, is not so valuable as pine, yet the hemlock bark, so largely used for tanning leather, and so well adapted to the manufacture of tannin extract, makes this item very important. Other timber, such as cherry, ash, poplar, beech, and maple, are also valuable for a variety of purposes. This property has an especial interest as possessing an apparently unlimited amount of yellow ocher, which has been declared, after thorough test by experts, to be of excellent quality. The bed is said to have a thickness of about five feet, and it extends under a large area. This ocher bed rests directly upon a bed of rich "clay band" carbonate of iron, an analysis of an average specimen of which is given by Mr. J. B. Britton, of Philadelphia, as follows:

Vol. matter (water and carb. acid)	17·66	Magnesia	1·08
Insol. siliceous matter	20·00	Sulphur	·02
Pure iron in form of protoxide	9·73	Phosphorus	·04
Pure iron in form of sesquioxide	24·65	Oxide of manganese	4·90
Oxygen with the iron	13·77		99·20
Alumina	6·40		
Lime	·95		

Metallic iron, 34·28 per cent.

A portion of the property is underlaid by the coal measures, which, in the neighboring district of the Loyal Sock, contain at least one large, workable bed of semi-bituminous coal of good quality. The coal has not, however, yet been proven upon these lands. Whether it exist there or not, the property is one of great value, and it is well worthy the investigation which its owners, in another column, invite capitalists to make.

The accompanying map shows the position of the property with regard to the great markets of the Wyoming Valley and of Central New York.

THE KNOWLES PUMPING MACHINERY.—These works, of this city, have lately shipped some very heavy pumps to the coal mines. They have also furnished a number for deep silver mines in the northwest. These builders are very successful in the matter of deep mine pumps, having furnished a number of pumps working against over one thousand (1000) feet head, and working with the utmost satisfaction. In the matter of irrigation by artesian wells, now attracting so much attention in Southern California and other localities, one of the difficult problems has been successful pumping. These works have given this subject special attention, and now have a number of pumps working in artesian wells of from 100 to 900 feet in depth, and of 4-inch to 10-inch bore. This will solve one part of what has heretofore been a perplexing problem. Where fuel is expensive, these machines are constructed in the form known as compound and condensing engines, by which the highest economy in use of fuel is obtained.

ROCK DRILLS AND AIR COMPRESSORS.

(*With Supplement* 9.)

The doubt in regard to the economy of using air compressors and rock drills in mines, is answered by their actual and general use in the principal mines of this country, and the main question at issue is which machines will do the most work for the least money.

The qualities which are requisite in drilling machines in order to attain this end are:

1. Simplicity of construction. Any refinement in design, not absolutely necessary, which adds to the number of parts is inadmissible in machines which are to be handled by strong men in rough places.
2. *Great* strength of parts, with light weights, to allow of *high pressures* of air and portability.
3. Adaptability and stability in the mounting of the drill, so as to drill holes in all directions without the necessity of frequent changes.
4. Economy in the cubic feet of compressed air to the foot of rock drilled.

Some very remarkable results have been obtained this last year in submarine rock drilling on the St. Lawrence River in the Lachine Rapids, where four Rand rock drills bored a total of thirty thousand feet of holes, three and one half inches diameter, under a maximum of twenty feet and minimum depth of twelve feet, in the short space of four months, keeping ahead of three dredges, which were employed in removing the broken rock.

The new "Calumet" pattern of column for supporting these drills avoids the necessity of frequent adjustment, and gives the required "sweep" in a heading, and allows the change of steel and cleaning of hole by the simple loosening of a nut.

The "Comstock" pattern of Rand's air compressor is a great improvement over those formerly made with oscillating steam-cylinder.

In this machine, by the use of the "Corliss frame," the greatest strength is obtained with the least amount of metal.

The steam-engine works with economy, and the air is cooled during the act of compression by a thorough system of water circulation around the working parts without injection of water in the cylinder.

The effort of the steam in the steam-cylinder and the resistance of the air in the air-cylinder is so nearly equalized by the adjustment of cranks and the use of a fly-wheel that entire uniformity of speed of the crank is obtained during its revolution, even when the steam is cut off at one seventh of the stroke.

One feature which attracts the eye of a practical superintendent is that the design of the machine is such that it can be cut up into parts of light *weight* for transportation, and that the *steam-engine* is a perfect, marketable machine in itself, which may be used for any other purpose if from any cause it is desired to separate it from the air compressor.

These compressors, as now made, are fully fifty per cent stronger than the ordinary engines made in the East for ordinary purposes. Their wide introduction by such mines as the California, Consolidated Virginia, Gould and Curry, Sierra Nevada, Ophir, Hale and Norcross, on the Comstock, and the Cheever, Oxford, and Crown Point Company in the East, is a most flattering testimonial to the excellence of the compressors and drills made by the Rand Drill Company of New York.

ON THE COMPOSITION AND INDUSTRIAL USE OF FURNACE GASES.*

By M. Cailletet.

The labors of M. H. St.-Claire Deville on dissociation, by opening a new path to scientific research, have led to the interpretation of a great number of metallurgical phenomena otherwise inexplicable. Collecting gases circulating in the most heated parts of furnaces working iron, the author has established the fact that these gases rapidly cooled differ completely from the results given by the analyses of Ebelmen. This able metallurgist, ignoring the phenomena of dissociation, collected the gases by slowly aspirating them through a long tube which allowed the combination of the dissociated elements. In Ebelmen's analyses the reaction nearly always appears complete, whereas the author finds that the fumes and carbureted gases may exist in the presence of oxygen and at the temperature of molten iron. Gas collected above the grating of a furnace where the bricks were at a temperature of intense white heat, contained: Oxygen, 13·15; carbonic oxide, 3·31; carbonic acid, 1·04; nitrogen (by difference), 82·5 per cent. In metallurgical works the gases issuing from the furnaces are generally directed beneath steam generators, but they cool very rapidly against the sides of the boiler; so that after traversing about 50 feet the temperature is lower than 500°, and the gases then contain, per cent: Oxygen, 7·65; carbonic oxide, 3·21; carbonic acid, 7·42; nitrogen, 81·72. The quantity of oxygen has thus diminished by nearly one half, and has been lost by its reaction on the finely-divided carbon which exists in great quantity in the atmosphere of the furnace. The author's researches have led him to establish at his works at St. Marc (Côte-d'Or) a kiln of large size, which receives the gases as they issue from the generator. Arriving in this kiln or oven, of which the section exceeds 32 square feet, the gases lose much of their velocity, while at the same time, they are ignited by passing over a small grate on which is burning some cheap combustible. The elevated temperature so obtained is utilized in the annealing of sheet-iron. By heating by this means, for about twelve hours, sheets that have been oxidized in the annealing furnace, the oxide has been completely reduced, leaving the surface clear and bright.

LEVELING IN 1824 AND LEVELING IN 1878.—In the annals of the State of Pennsylvania (Pennsylvania State Improvements—main line) it is mentioned as a remarkable specimen of unusually accurate leveling, that in a circle of 12 miles that was leveled, the error was only one foot and two tenths. This was in 1824. United States Engineers are engaged at present in running a line of levels between the Chesapeake and Delaware bays for the purpose of determining the feasibility of a ship canal. In testing new leveling instruments furnished by the United States for the work (Heller & Brightly make), a line of test levels was run of over 10 miles, and the difference of level on the closing bench mark was only five thousandths of a foot (0·005).

* Abstract of a paper in *Comptes rendus de l'Académie des Sciences*, vol. lxxxv., p. 955. From the Proceedings of the Institution of Civil Engineers of London. Edited by James Forrest, Secretary.

THE ONTARIO MINE, UTAH.

We give the following brief description of the Ontario as a representative American mine, and the leading mine now quoted on the New York Stock Exchange :

The mine is situated on the north face of a mountain which is a spur of the Wahsatch, and is about 32 miles from Salt Lake City. The geologic formation of the district consists of quartzite and shale, with an occasional but scanty bed of sandy limestone. The predominating quartzite has been rifted and fissured in every direction by the volcanic disturbances that are evident throughout these mountains, and great dikes of porphyry have been forced up through the principal fissures. The Ontario lode has a strike nearly east and west, and a dip toward the north of about twenty degrees from the vertical. On the north side of the lode, parallel with it in strike and dip, and at a general distance of about fifty feet, is one of the large dikes of feldspathic porphyry above referred to.

The workings of the Ontario mine have been systematic and effective. In proportion to its depth the regularity and quantity of its daily yield has been immense; while the prospect is that for many years to come the regular output will in nowise diminish.

The thickness of the Ontario lode varies from one foot to ten feet between the walls; the average thickness, estimated in a length of over 1000 feet underground and including all grades of ore, being about three feet. The ore in the upper levels consists of chloride, iodide, and bromide of silver and some native silver. As depth is attained, the ore increases in richness, and on the 500-foot level, which has been extended eastward 815 feet and westward 450 feet, the entire distance is through ore of great value, averaging 200 ounces per ton. These richer ores, however, prove to be refractory, and must be subjected to a roasting and chloridizing process before they can be milled; but the additional expense of reduction to the ton is very slight compared with the increased yield of valuable metal.

The first work that was done on the Ontario was a cut in the ravine near the surface, where levels were run easterly 450 feet and westerly 390 feet, making a line of 840 feet continuously on the vein. This exploration was followed by the erection of hoisting and pumping works in order to sink a shaft 100 feet, to open new levels below the water-line. From this shaft cross-cuts were made, both east and west, a total distance of 985 feet. By this time it was thoroughly demonstrated that the vein was permanent and of great value, and the shaft was at once deepened another hundred feet, and other levels were run easterly and westerly on the vein. From that time to this, steady and rapid progress has been made in developing the mine. [This mine has already been illustrated in the ENGINEERING AND MINING JOURNAL.] Larger and more powerful pumps have been put in; substantial timbering has been done; the shaft has been repeatedly deepened, and levels have been run every 100 feet, until now it has attained the depth of nearly 600 feet, and another level will soon be commenced. As these levels have all been run on the vein, there has been a constant yield of ore during exploration. No stoping has been done below the 500-foot level, and but little stoping below the 400-foot level, and the immense bodies of ore exposed in the lower workings remain, therefore, intact. Meanwhile, in sinking the shaft vertically 600 feet, the dip of the lode has carried the vein some distance from the foot of the shaft. Therefore, a new shaft has been completed 300 feet northward from the present one. It is strongly built with 10 by 12 red pine timbers, and contains two hoisting compartments 4½ by 5 feet in the clear, in addition to a pump compartment 5 by 7 feet. This shaft is furnished with new hoisting works at a cost of about $40,000. It connects with a cross-cut from the 500-foot level; at 600 feet it will start another cross-cut, tapping the vein; and at the depth of 1500 feet will strike the pitch of the lode. It will thus be seen that the working capacity of the mine, already large, will shortly be more than doubled; while the systematic order in which developments have hitherto been made can be carried with equal success to a very great depth.

The property of the Ontario Company also includes the "Swisserland Mining Claim," which adjoins the Ontario on the east, and on which a United States patent has been applied for.

In speaking of the prospective value of the Ontario mine, Prof. J. E. Clayton, in his report, says:

"First. The vein is in a true *fissure* of great length, having been traced to the limits of the company's property.

"Second. The increased power, regularity, and average of value of the vein in the lowest workings, give the strongest possible assurance of continuance to great depth.

"Third. The association of this vein in a line with a great porphyry dike gives the strongest geological assurance that its source is deep-seated and far below any point that can be reached by the best modern appliances and skill.

"A fair deduction from the facts above stated leads to the conclusion that the explorations already made in this vein or lode are mere surface work, compared with what may be done in the future by continuance of good business management, and the skill, energy, and enterprise that have brought the mine to its present great positive value."

About a mile and a half north of the mine and down the cañon are situated the extensive buildings necessary for reducing the ore from these mines. They consist of a forty-stamp mill for dry crushing, a large Stetefeldt furnace for chloridizing base or refractory ores, retort and melting room, coal house, lodging and boarding houses for the fifty men who are employed at the mill, offices, etc. [This mill has likewise been illustrated in the ENGINEERING AND MINING JOURNAL.] These works are valued, in round numbers, at $325,000, while the buildings and hoisting works at and around the mine, where 130 men are employed, fed, and lodged, are estimated, with their stores, to be worth over $100,000. On January 31st, 1878, these properties necessary to the working of the mine and its product, together with the ores on the dump, and cash on hand, amounted to $878,699.54, and all dividends paid. The liabilities of the concern on the same day amounted to $18,149.47. Every thing in and around the works is in good repair, and gives evidence of the best possible management and economy. A water-ditch and flume, half a mile in length, have been constructed and have been connected with the mill by a four-inch pipe, 3100 feet long, with a pressure of 200 feet vertical.

Another Stetefeldt roaster is in course of construction and nearly completed that will largely increase the production of the mill.

On the 19th of October last, the old hoisting works of the company were destroyed by fire, and while the actual damage sustained was comparatively slight, the consequential damage was more serious, resulting in a disarrangement of the pumping machinery in the old shaft, and a temporary suspension of operations at the mill. The mills, however, recommenced operations on December 2d, and the present prospects and condition of the property are better than before the accident.

We give, in conclusion a brief tabulated statement of the results of this great enterprise to date :

Gross yield of bullion to the close of year 1876, gold value	$906,459.57
Ore sold, currency, " " " "	42,116.05
Gross yield of bullion during 1877 and to January 31st, 1878, gold value	1,896,745.14
Ore sold, currency, " " " "	10,614.39
Gross yield of bullion from January 31st, 1878, to December 6th, 1878, assay value	1,147,261.00
Total gross production	$4,003,196.15

A regular monthly dividend of fifty cents per share has been paid on the 15th of each month, which, with the extras paid, has made an average monthly dividend of nearly $1 per share.

The total dividends paid to date (including dividend No. 38, paid on the 16th inst.) are $1,900,000.

The company was incorporated under the laws of California, Dec. 16th, 1876, with a full-paid capital stock of $10,000,000, being 100,000 shares of $100 each. The stock was put upon the New York Stock Exchange, May 23d, 1877, and is the only silver mine on the list.

The principal officers of the company are J. B. Haggin, San Francisco, President and Treasurer; R. P. Lounsbery, New York City, Vice-President; B. B. Minor, of San Francisco, Secretary; H. B. Parsons, of New York City, Assistant Secretary; R. C. Chambers, Salt Lake City, Superintendent.

FORMS AND DIMENSIONS OF BLAST-FURNACES.*

By L. Gruner.

Blast-furnaces may be divided into three groups according to the forms of their interiors.

In short or squat furnaces (*fours trapus*) the total height does not exceed three times the diameter of the widest part, or $\frac{H}{D}$ is equal to or less than 3. In ordinary furnaces the ratio $\frac{H}{D}$ varies between 3 and 4, and in tall or slender furnaces (*fours élancés*) it is not less than four and may even exceed 5.

Of these forms of furnace the *fours élancés* are found to work in every way the most advantageously, producing more metal per twenty-four hours in proportion to their capacity than the *fours ordinaires* or the *fours trapus*, and using less fuel.

At Hieflau, in 1855, the alteration of a furnace of 31 cubic meters capacity in which the ratio $\frac{H}{D}$ was 4·51, to one of the same height but of 47 cubic meters capacity, and with $\frac{H}{D} = 3{\cdot}57$ caused at once an increased consumption of fuel.

Up to a capacity of 150 to 200 (5296 to 7063 cubic feet) cubic meters, so long as the slender form of the furnace is retained each increase in capacity is generally accompanied by a proportional augmentation in the make; beyond this size the increase of output obtained by a further enlargement becomes comparatively small, and in the very large Cleveland furnaces an increase in capacity of 300 or 400 cubic meters does not augment the make at all.

The most advantageous dimensions appear to be, in the case of charcoal furnaces of which the height can scarcely exceed 16 meters (52½ feet), a capacity of 60 to 70 (2118 to 2472 cubic feet) cubic meters; and in the case of coke furnaces, where the character of the materials treated admits of a height of 20 meters, a capacity of 180 to 200 cubic meters.

The following forms of furnace are recommended as being the most suitable for different classes of materials :

	Height.	Diameter at widest part.	Total capacity.	Ratio $\frac{H}{D}$.
	Meters.	Meters.	Cubic meters.	
1. Charcoal furnace	14	3·0	60	4·66
2. Coke furnace, for fusible and readily reduced ores	16	4·0	140	4·00
3. Coke furnace for less fusible and less readily reduced ores in large pieces	18	4·5	200	4·00

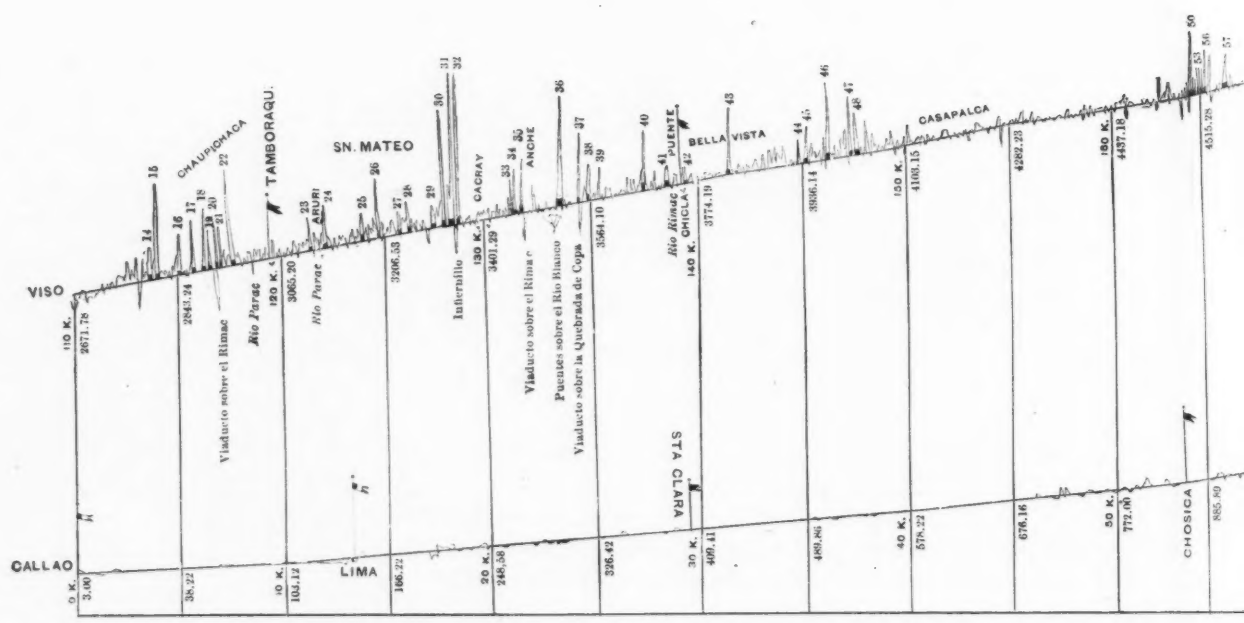
From easily-reduced ores the first of these furnaces would yield 30 and the second 50 to 60 tons of white iron per twenty-four hours.

In conclusion, the author points out that in large furnaces, 2·50 to 3 meters diameter in the throat, the use of a suitable charging apparatus, such as a well-proportioned cup and cone, is indispensable, in order to insure a proper distribution of the materials.

A table is added of the dimensions and working results of thirty-four furnaces, and the forms of most of these are illustrated in two plates accompanying the paper.

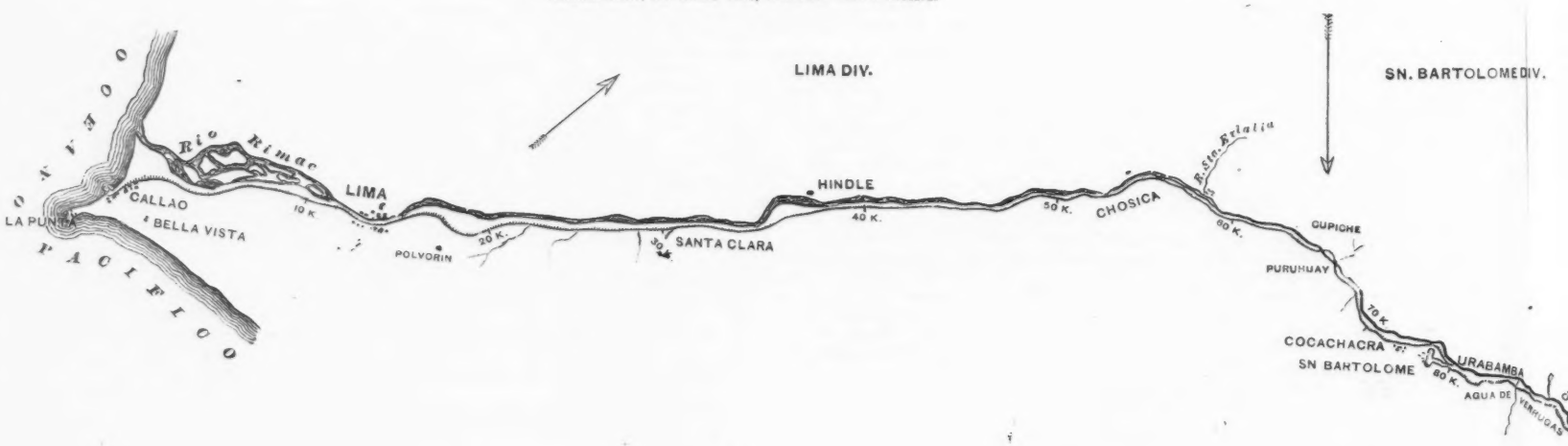
POCKET MICROPHONE.—M. Trouvé has invented a cylindrical microphone which resembles a small dark-lantern, with a carbon crayon substituted for the candle. When placed in the middle of a room, it reveals all secrets. It transmits the voice admirably to a receiving telephone, even when the speaker stands 25 meters (82 ft.) or more from the microphone. When a watch is placed in the interior, it seems to be making unheard-of efforts to get out. The instrument can be easily used for revealing the normal or morbid movements of the heart or lungs.—*La Nature, trans. in Jour. Franklin Inst.*

* Abstract of a paper in *Annales des Mines*, 7th series, vol. xii., p. 472.



Horizontal Scale, 0.0033 Meters=1 Killom.
Vertical Scale, for Surface Line, 0.0033=20 Meters.
Vertical Scale, for Grade Line, 0.0033=200 Meters.

PROFILE OF THE CALLAO, LIMA,



PLAN SHOWING ALLIGNMENT OF THE CAL

PROFILE AND PLAN OF THE CALLAO, LIMA AND

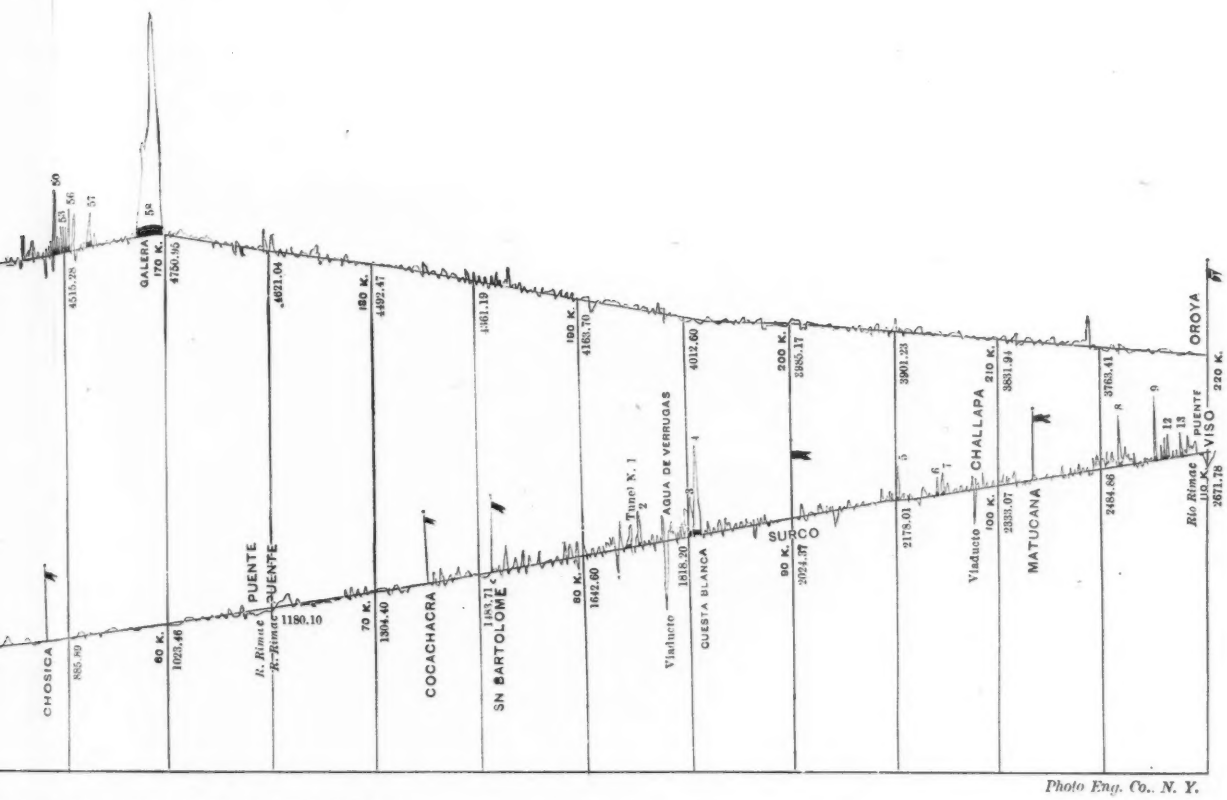
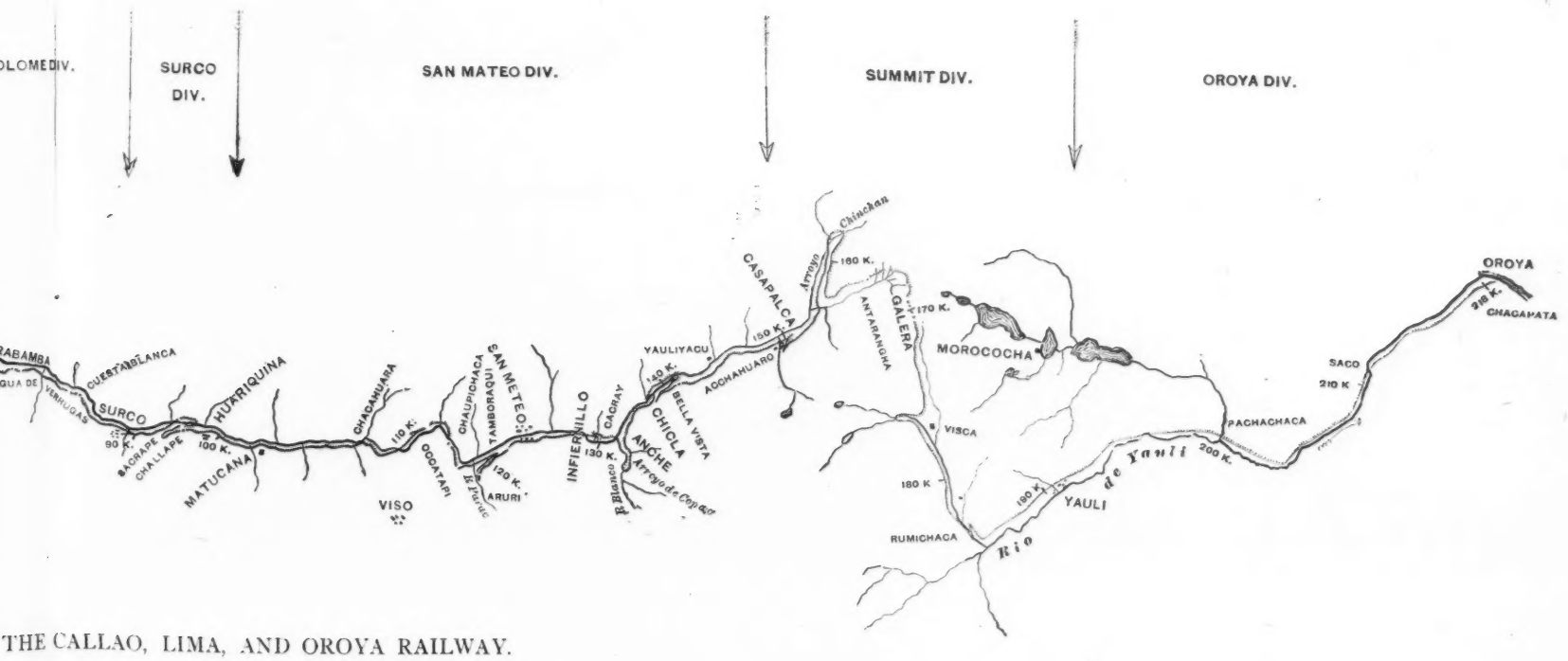


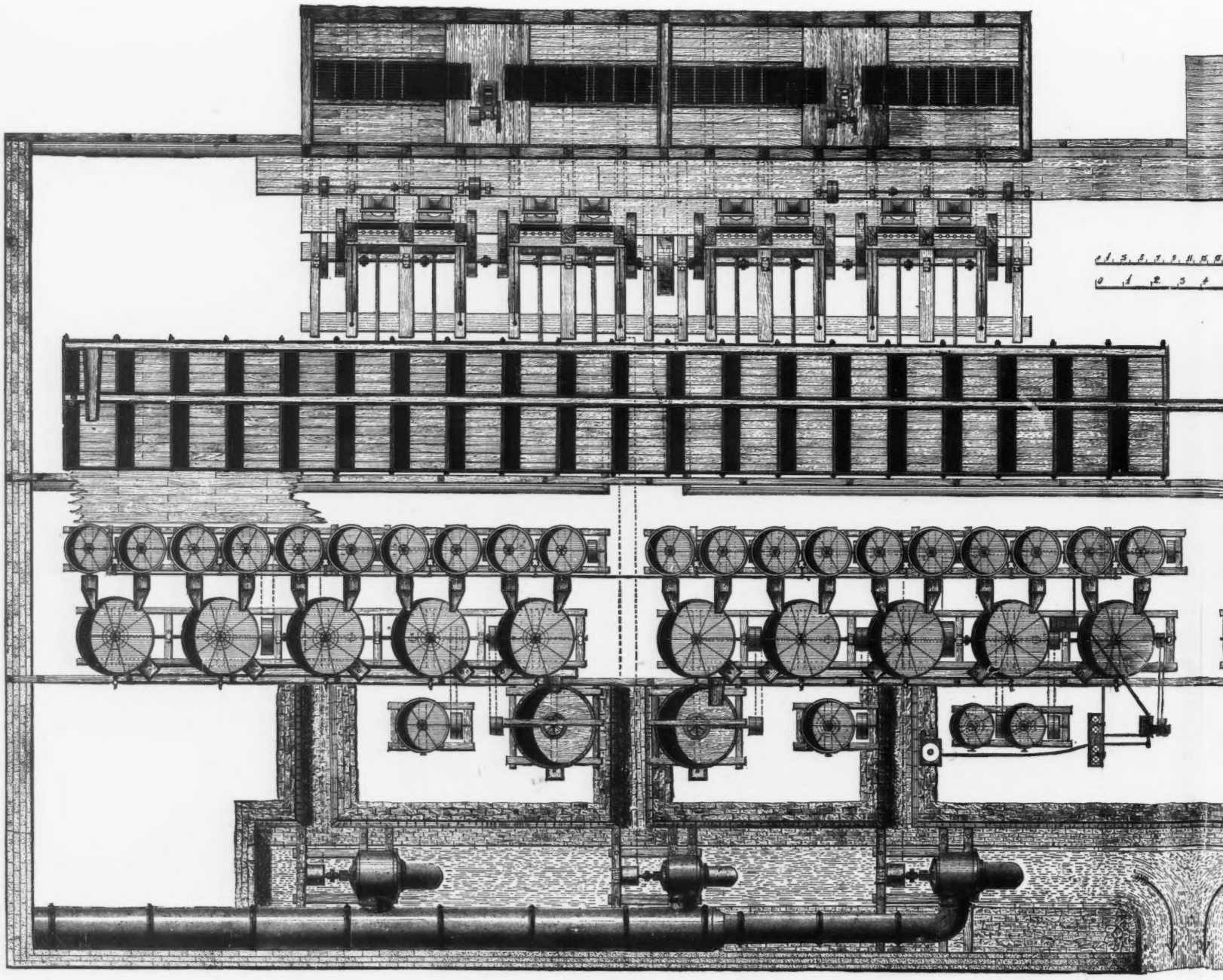
Photo Eng. Co., N. Y.

AO, LIMA, AND OROYA, RAILWAY.

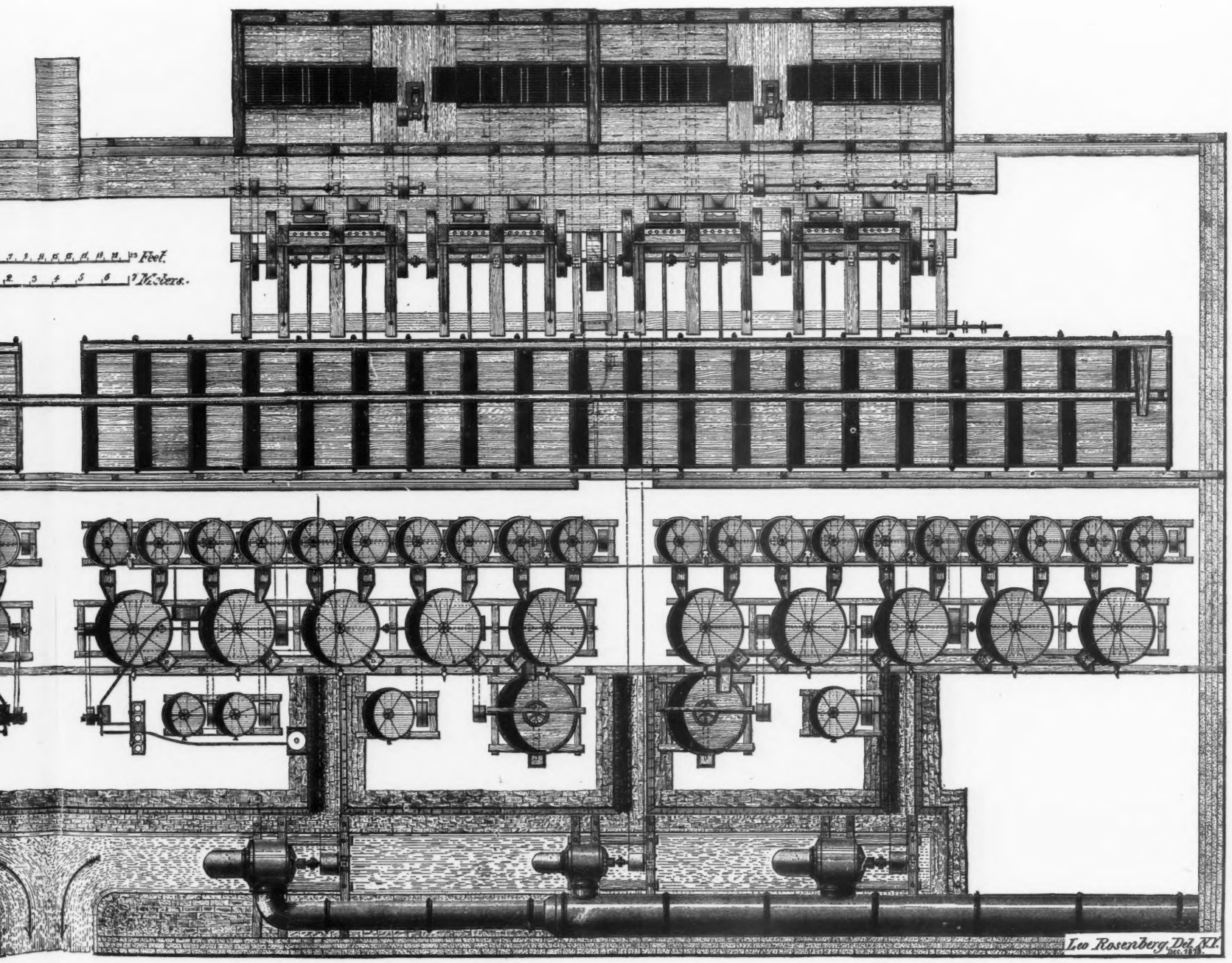


THE CALLAO, LIMA, AND OROYA RAILWAY.

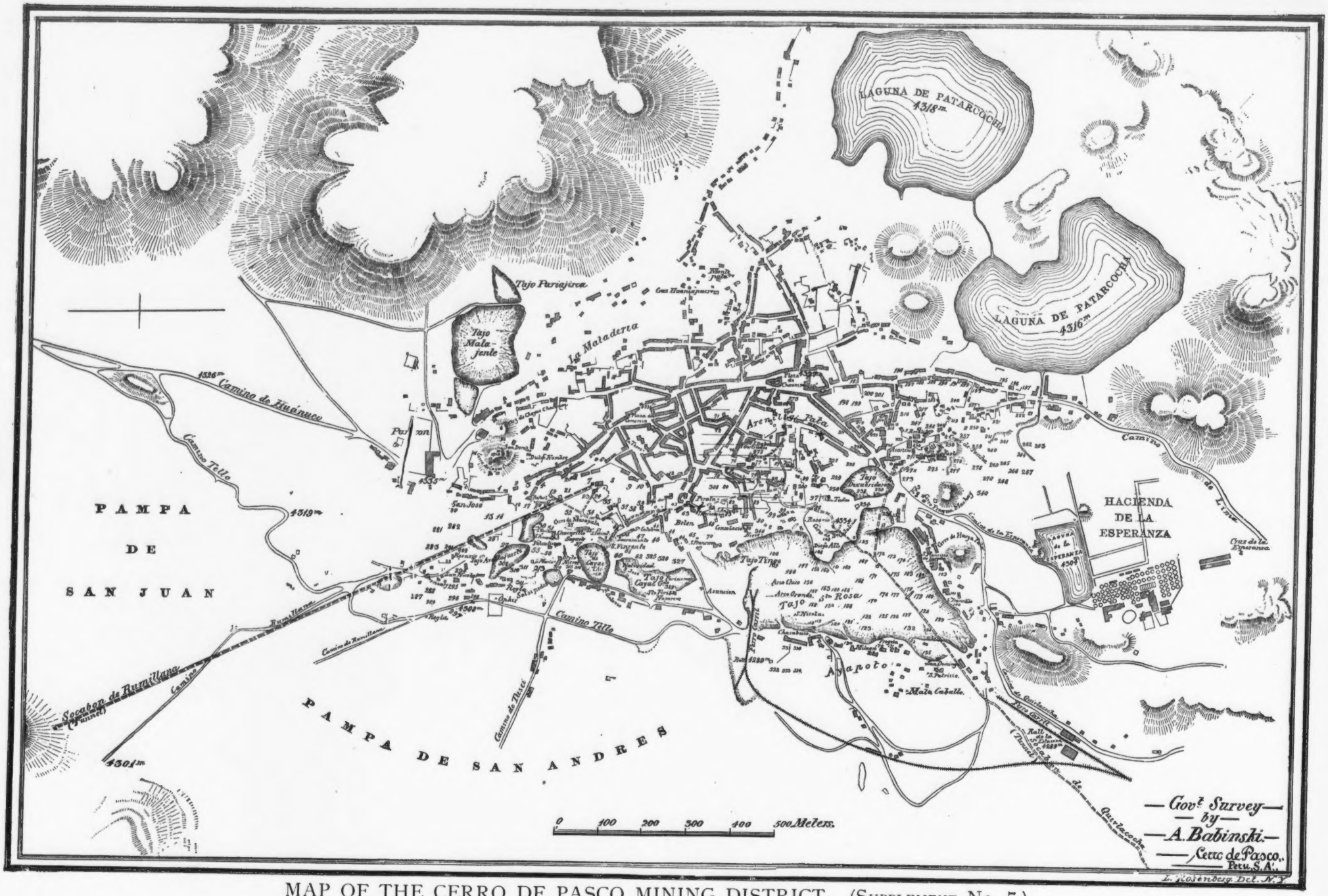
A AND AND OROYA RAILWA Y. (SUPPLEMENT NO. 4.)



THE CERRO DE PASCO 80 STAMP SILVE



P SILVER MILL. PLAN VIEW. (SUPPLEMENT NO. 5.)


LAGUNA DE PATARCOCHA
4318m.
LAGUNA DE PATARCOCHA
4316m.
Tajo Pariajirca
Tajo Mala-jente
La Matadera
1336m. Camino de Huánuco
Camino Tello
PAMPA DE SAN JUAN
4319m.
4301m.
Socabon de Rumillana
Camino de Rumillana
Camino Tello
PAMPA DE SAN ANDRES
Camino de Muré
Tajo Tinyahuarco
Tajo Descubridora
Tajo Rosa
Tajo Cayal Chico
Tajo Yanacancha
Tajo Chaupiloma
Tajo Ocroyoc
Tajo Yanamate
Tajo Ayapoto
Tajo Chaupiloma
Tajo Descubridora
Tajo Tinyahuarco
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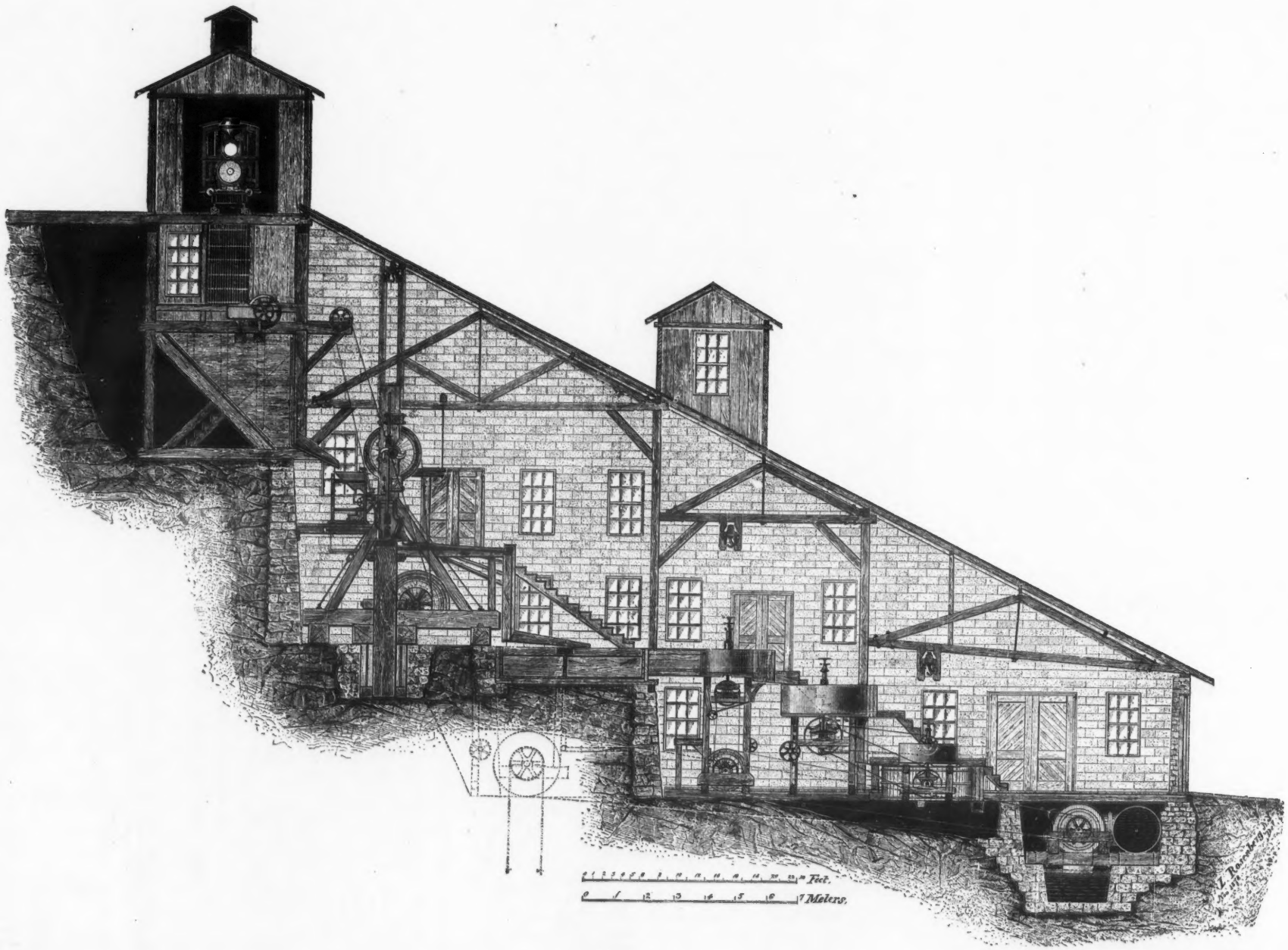
Tajo Rosa
Tajo Descubridora
Tajo Chaupiloma



THE CERRO DE PASCO 80 STAMP SILVER MILL. (SUPPLEMENT NO. 6.)

(Elevation.)

GRAPHITE AND ITS USES.

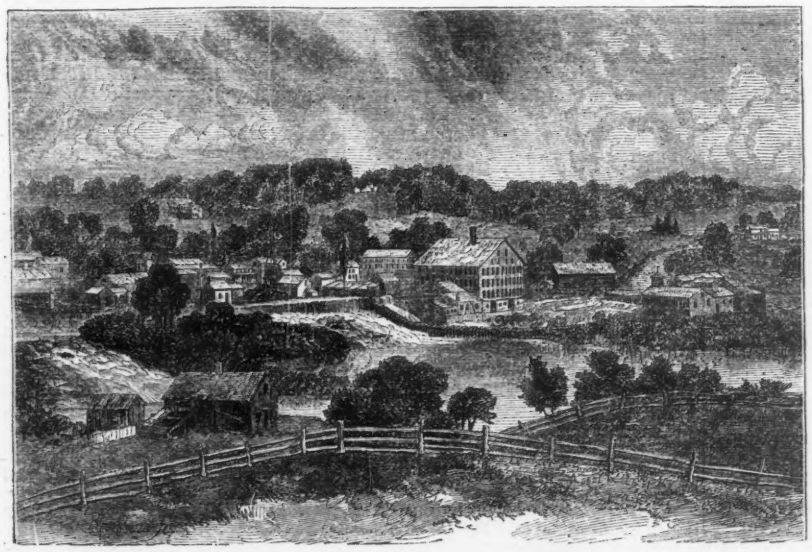
The mines of the American Graphite Company, now owned by the Dixon Crucible Company of Jersey City, are located on the eastern slope of what is designated as the "black-lead mountain" on the old maps of Essex County, in the State of New York. The mountain lies just back of the village of Ticonderoga, and the mill for separating, pulverizing, and preparing the graphite is located on the north side of the lower fall of the outlet of Lake George into Lake Champlain.

The Dixon Company owns the water-power, and the mill is six stories high on the lower side, 80 by 90 feet, and is run by a turbine wheel of 100 horse-power. The ore is mainly of the foliated variety, interspersed in gneiss and quartz in veins, with a dip of about 45 degrees, some of the veins much richer than others. One of the veins has been worked to a depth of about 350 feet, and is found of varying thickness and with occasional pockets.

The graphite removed is of the very finest, when separated from the carrying rock. The distance from mine to mill is less than two miles, with a down-grade, so that the ore can be transported by outside local labor at a cost of from 20 to 50 cents per ton, according to the time of year. Having an ample supply of water, the crushing in an ordinary stamp battery and separating of the ore on Cornish buddles and in settling tanks is rapid and economical. The separated graphite scales are then ground in water to certain fineness suitable for the different uses, the most important of which are the manufacture of crucibles, lubricants, pencils, and stove polish.

GRAPHITE CRUCIBLES.

The late Mr. Dixon was the pioneer in this country in the manufacture of graphite crucibles, and the first to utilize foliated graphite for any purpose. This article, for years past distributed over the world from Ceylon, where there are vast deposits of it, was not considered of any value till Joseph Dixon adopted it in the manufacture of crucibles, about 1829 or '30. He started the manufacture in October, 1827, using a compact graphite found in New Hampshire; but, seeing some of the specimens of the foliated variety brought from India by trading ships, he tested them and procured a shipment, following it with another, and finally adopted it entirely, and so he became the father of a new industry that now extends over the civilized world and gave rise to one of the sources of revenue of the British empire in India. The Ceylon graphite had no successful rival till the Dixon Company took hold of the deposits at Ticonderoga, and produced grades for special uses that had never before been known to commerce. These crucibles are made of all sizes, from those to melt one oz. of metal to those of a capacity of 600 lbs.



THE DIXON GRAPHITE MILLS AT TICONDEROGA, N. Y.

"GRAPHITE FOR FOUNDRY FACINGS,"

or dusting molds, is so fine that it is about as economical as the common facings, and produces a surface on castings that can not be obtained by any other means. A special grade is prepared for a core-wash.

"DIXON'S CARBURET OF IRON STOVE-POLISH"

is a very important article of commerce, more of it being sold than of all other kinds added together. It is vastly better than the English, polishes quicker, lasts longer, has no smell when applied to hot iron, is put up in solid cubes, and is neat and clean to use.

GRAPHITE AS A LUBRICANT.

The merits of graphite for lubricating, either dry, as in blowing cylinders, or mixed with oil or grease, have not been fully appreciated, and this may be due in part to the fact that the article usually offered for lubricating has not been pure graphite prepared for this special purpose by those who understood their business. But still another difficulty presents itself. A common ground graphite containing all the natural impurities has much the same appearance as the purified and prepared article that has been ground and separated in water, so that purchasers are deceived in the quality and often decide against the use of all graphite because they have failed in results by the use of a grade totally unfit for the use intended. This is especially true of graphite for lubricating.

GRAPHITE FOR PENCILS,

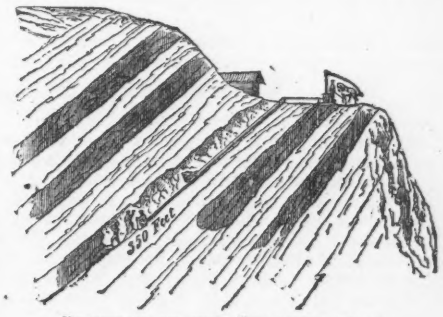
The compact or granulated variety of graphite is alone suitable for pencils, and this is prepared at the works of the Dixon Company in Jersey City.

In the pencil department no skilled labor is employed. The shaping machine turns out 216 per minute with a surface perfectly smooth, ready for coloring and polishing, both of which operations are performed by automatic machines.

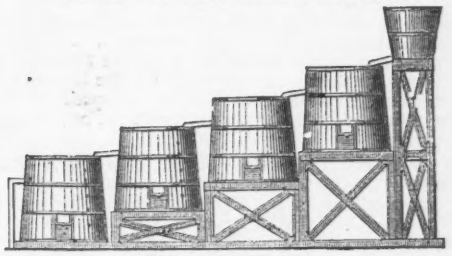
The works are producing now about 85,000 pencils per day, and yet the rooms are as clean and quiet as on a holiday. The company's cedar mill is in Florida, where the little cedar boards are sawed to a size suitable for the machines. The prepared graphite from Ticonderoga is carried through the old "floating" process (see cut) in order to produce the fine grades. The clay brought from Germany is also floated, and the very finest is mixed with the finest graphite in certain proportions to produce the various grades of "leads." The mixture, a plastic mass, is placed in a cast-iron cylinder with an opening in the bottom of the exact size and shape, square or round, of the leads desired. A screw-press piston enters the cylinder from the top, and, with a steady pressure, drives the composition through the opening to coil up like a thread underneath. It is then straightened out in lengths, dried, baked in a crucible, coming out strong enough to handle, like knitting-needles, and they are then ready for pencil-making.

The pencils are produced in ten grades of leads for artists and draftsmen, and in five grades of leads for commercial use. They are fine, smooth, strong, and pleasant to use, beyond any thing heretofore produced; hold their point in wear, and are in every respect a credit to American mechanical skill. The standard commercial pencils are in five grades of leads, viz.: S—soft; SM—soft medium; M—medium; H—hard; VH—very hard; and are in round and hexagon shapes, and of various styles, beautifully finished by machinery.

For fine mechanical drawing these pencils are not excelled by the best European make; they will hold a needle point better and longer than any imported pencil.



SECTION OF THE GRAPHITE MINE.



"FLOATING" TANKS.

This company seems to be managed upon the principle that the people want the very best article they can get for the money, and the name of the company has come to be considered as the stamp of good faith, both as regards the quality of the article and the treatment of customers, and a dealer or customer in Australia can get as favorable terms by letter as if present in person to drive a bargain. The company was one of the foremost American manufacturers to enter the export trade, and its productions are already known in every civilized country.

The Hon. Orestes Cleveland, President of the company, is widely known as the head of the graphite trade in America. He is perhaps the most expert judge of the article in the world, and has done more than any other person to bring it into general use. He has, in fact, made it an industry of importance.

GOLD IN THE LEADVILLE (COLO.) ORES.

The following assays were made by Messrs. Patrick & Bridge, of Leadville, and represent an average, it is said, of 1200 tons of ore uncovered in the two drifts of the Adlaide mine:

1.	Per ton, 2000 lbs	63 oz.	silver,	5½ oz. gold.
2.	" "	96	"	½ "
3.	" "	57	"	3·3 "
4.	" "	73	"	2¼ "
5.	" "	150	"	4·10 "
6.	" "	209	"	Not assayed for gold.
7.	" "	568	"	9·67 oz. gold.

The Secretary of the company writes: "The value of bullion from ore averaging as above (50 per cent. lead), would be over $600 per ton."

NEW PROCESS FOR THE MANUFACTURE OF CAUSTIC SODA.—Bazin first converts the sulphate into sulphide by ignition with wood-charcoal, dissolves this in boiling water, and treats the boiling solution with cupric or ferric oxide. The metal combines with sulphur and remains undissolved, while the sodium takes in exchange oxygen, and becomes converted into a strong solution of caustic soda. Whether the reaction of the metallic oxide and the alkaline sulphide is complete is scarcely certain.

THE ELECTRIC LIGHT IN MINES, FACTORIES, ETC.

(*With Supplement*, 10.)

In a previous number of the JOURNAL we published cuts and descriptions of the Brush Dynamo-Electric machines and lamps, together with some statements regarding their practical operation and economy of power. In this paper it is proposed to speak of their adaptation to the illumination of various mining and engineering works, as well as to factories, mills, docks, parks, public halls, stores, etc., etc.

In the accompanying Supplement sheet, No. 10, is a representation of the apparatus as arranged for the illumination of large underground workings. The machine generating the electricity is placed near the engine from which it gets the necessary power. The apparatus shown is known as the No. 5, single current, six-light machine, and is supplied with six lamps of the latest pattern, so arranged as to burn steadily and uniformly in one circuit. A single wire is run from the machine down the shaft and around to the various points where light is needed and then back up the shaft to the machine. At any point where light is wanted, the wire is cut and the lamp introduced, and if at any time it is desired to change the location of any of the lamps as work progresses, it is done in a few moments and without preventing the other lamps from burning. The system is thus entirely portable and capable of being adapted to the varied circumstances attending mining operations. The lamps are of simple construction and require attention only when the carbons need replenishing. By varying the size of the carbons they can be made to last from six to twenty-four hours without renewal; but the steadiest light is obtained with carbon points about $\frac{3}{8}$ of an inch square, or $\frac{1}{2}$ inch in diameter. Various sizes of machines are made, giving one, two, three, four, five, six, ten, fifteen, or eighteen lights each, so that the requirements of any particular case may be met. These machines vary in power from 1000 to 35,000 candle-power and in price from $375 to $2000. The machine shown in the illustration is of 12,000 candle-power, yielding six lights of 2000 candle-power each. It absorbs six and one half indicated horse-power, and the armature revolves at 900 revolutions per minute.

THE ELECTRIC LIGHT IN FIERY MINES.

The immense advantage afforded by electric light in operations underground will be at once apparent; for, with a trifling expense after first cost, it is practicable to introduce a flood of light almost equal to daylight into the remotest recesses of the mines. A still further advantage is, that the electric light does not require oxygen to support its combustion, and in mines where explosive gases are found the electric lamp may be inclosed in an air-tight glass case, in which it will burn with undiminished brilliancy. The large chambers in coal mines would thus be safely and so thoroughly lighted as to render every part of the roof clearly visible, and thus afford security against the most fatal cause of accidents in mines, "falls of the roof." With the present system of lighting it is quite impossible to see the roof in the chambers in thick seams, and many lives are annually sacrificed by falls of roof that might be avoided if that could be done. All that is necessary in order to start the light is to set the machine running, and immediately the light springs up with full power in all the lamps in the circuit, and continues burning until the machine is stopped. If temporarily all the lights are not wanted, one or two may be cut out of circuit without disturbing the rest.

A similar application of electric light is that made use of in the preparation of the foundations of the new bridge of the Chicago and Alton Railroad across the Missouri River at Glasgow, Missouri. The engineer in charge, Mr. W. S. Smith, purchased a small-sized Brush machine and lamp, and with it lights up the interior of the caisson in use for the above purpose. It answers the purpose admirably, and prevents the contamination of the air that would follow the use of any other light under these circumstances, besides yielding a flood of light that makes the work of excavating much safer and more rapid. Electric light must inevitably come into general use for work of this character.

Rolling mills, foundries, factories, machine-shops, mills, and places of like character are also situations where electric light is especially valuable and economical. In all these places power is ordinarily at hand, and the comparatively small amount needed to run the electrical machine would hardly be missed and would usually be left out of the account in estimating the cost of the light. There are also situations where work is often carried on at night in large rooms, and the cost of light from gas or oil ordinarily prevents them from being more than dimly lighted except at a few points. The result is that the amount and quality of the work done at night does not compare favorably with that done by day, and there is greater opportunity for workmen to lounge around without detection. Electric light changes all this, for it practically introduces daylight into the darkest corners, enables the superintendent to command the entire shop with a glance, and gives the workmen no excuse for poor work or wasted time.

As instances of the practical application of the Brush Electric Light for such purposes we mention the case of the Washburn & Moen Manufacturing Company, of Worcester, Mass., who are using a four-light machine, and with it light up their wire mills and a large open space where the billets are stored. Also the Edgemoor Iron Company, of Edgemoor, near Wilmington, Del., who are using eight Brush lights in the various departments of their works. The Park Brothers' Steel Works, of Pittsburg, is another instance, and a number of the largest and most enterprising mills engaged in the manufacture of textile fabrics in New England are arranging for its introduction. Among these may be mentioned the Merrimack Mill, at Lowell; the Conant Thread Company, at Pawtucket; the Riverside Mill, at Providence, and others of similar size and importance. The light is adapted, however, to other uses, of which the following are examples: In the Palace Hotel, at San Francisco, the inner court, the dining-room, the restaurant, etc., are nightly illuminated by the Brush light. In this case the lamps are provided with large opal globes, which soften and subdue the light so that it is a general favorite with the guests. At Cincinnati a machine is in use by Dr. Longworth, of the Cincinnati Medical College, for the illumination of the hall and for projection purposes for demonstrations of anatomy. In Boston, the immense clothing establishment of Freeland, Loomis & Co. is nightly made brilliant by six Brush lamps, and the whiteness and power of the light enables them to sell their goods as well as by day. It is also being introduced into the famous Boston Music Hall, and will this winter shine upon the brilliant audiences there gathered.

These are selected samples of the work of illumination that the Brush apparatus is capable of, and is actually doing, from day to day, and the field is rapidly widening. Mr. Brush, however, does not expect to adapt his apparatus to *domestic* use. This field he leaves to gas and Edison. For the illumination of docks, public parks, open spaces, depots, warehouses, etc., the light is evidently suitable, and it will also no doubt be used where it is desired to conduct building operations at night and for out-door illumination generally. A novel and valuable outfit for a wrecking train or a railroad is a portable light machine, with an engine on the same base, arranged so that steam could be taken from the boiler of the locomotive, and thus a powerful light provided for operations at night. A similar apparatus for use as a locomotive head-light, and for ferry-boats and steamers in foggy weather, is being arranged by Mr. Brush.

The important point of cost of the light as compared with gas should be dwelt upon. In a Brush lamp of 2000 candle-power, equal to 120 five-foot gas-burners in photometric power, the hourly consumption of carbon is two inches (where carbon points are used), costing three cents. Very careful estimates, in which allowance has been made for cost of power, attendance, wear and tear, carbons, oil, etc., show great economy in the use of the light in all places where its full power can be utilized. In the case of the machine yielding 18 lights of 2000 candle-power each, the total cost of the light, including all the items above mentioned, is about $1 per hour, whereas gas, giving the same photometric power, would cost, at $2 per thousand cubic feet, $22.50 per hour; or, if allowance be further made for the fact that gas may be distributed more generally and thus be relatively more effective than the electric light, it will still be found that gas will cost from five to ten times as much, where considerable spaces are to be lighted.

At the present time the Brush Electric Light apparatus seems to be occupying the field of practical electric lighting almost to the exclusion of other systems. In fully four fifths of all the cases where electric light is in actual industrial use in this country, the Brush apparatus has been adopted. This is no doubt accounted for by the fact that the Brush machines and lamps possess points of advantage for practical use not possessed by any others. The most important of these are the following: In the first place, it is claimed that the Brush machine produces the greatest amount of available current from a given absorption of power with the least amount of heat in the machine itself. Many electrical machines now before the public become so badly heated after being run a few hours that their efficiency is decreased and there is danger of the destruction of the insulation upon the wire, which would at once stop the current. This is especially true of the Siemens, Wallace, and other machines, but not of the Brush, which heats less than any other machine in use. At the recent fair of the Mechanics' Charitable Association in Boston (where the Brush machine received the gold medal), careful tests were made by F. W. Bacon, Esq., Consulting Engineer, of Boston, to ascertain what power was used by the electric-light machines employed to light the building. The two systems there in use were the Brush and the Wallace-Farmer. The results obtained are embodied in a full report made by Mr. Bacon to the judges having in charge this department. The figures are as follows:

Power required to drive one Brush machine giving four lights (the No. 5 12,000-candle machine, giving two, four, five, or six lights), 6·448 horse-power, or 1·612 horse-power per light.

Power required to drive one Wallace-Farmer machine giving three lights (their 8-inch 6000-candle machine), 10 horse-power, or 3·568 horse-power per light.

Power required to drive one Wallace-Farmer machine, giving five lights (their 9-inch 10,000-candle machine), 16 horse-power, or 3·274 horse-power per light.

These results are practically the same as those obtained by the Franklin Institute of Philadelphia, published by them in May and June, 1878. By their figures the Brush machine excelled the Wallace-Farmer in light per horse-power, as 377 to 113. Further confirmation is furnished by tests made by the Buckeye Engine Company with one of their famous quick-running, automatic cut-off engines at the recent Fair of the American Institute in New York. Their results were almost exactly the same as those obtained at Boston.

A second advantage afforded by the Brush system is the fact that the new lamp recently perfected by Mr. Brush is the only one so far brought out that permits of a number being burned with steadiness and uniformity in the circuit of a single machine. A very ingenious device is embodied in these lamps which prevents any one lamp from getting more than its share of the general current. There is, therefore, none of that "stealing of the arc" which has been the prolific cause of flickering and unsteadiness in all previous attempts at burning several lights in one circuit. So perfectly does the Brush lamp perform its functions that, in the case of the large machine furnishing 18 2000 candle-power lights *in one circuit*, as well as in the four and six-light machines, there is no perceptible difference in the power or steadiness of the various lights. The verdict of the public at the Boston and New York fairs, as well as where the light is in regular use, seems clearly to indicate that in steadiness and uniformity the Brush light leads the list.

The 18-light machine above referred to marks a stage in the progress of the subdivision of the light which has long seemed almost impossible of attainment. The machine, including its base, weighs something over 2000 lbs. The armature is 20 inches in diameter, and revolves at 750 revolutions per minute. The machine is capable of producing a voltaic arc between two points about twenty inches in length. It absorbs about 12 horse-power, and runs smoothly and steadily. In the Gramme-Jablochkoff system of electric lighting, in use in Paris, two Gramme machines, working together, absorbing 16 H.P., furnish four currents of electricity, and four Jablochkoff candles are burned in each current. Prior to the construction of the latest Brush machine there is no record of the production of more than six steady, uniform lights by the voltaic arc from one machine, in a single circuit. It should be a matter of pride to Americans that the latest and greatest accomplishment in this important field has been made by an American. Mr. Brush is a resident and native of Ohio, and a mining engineer by profession—a graduate of Michigan University.

He has placed the exclusive control of the manufacture and sale of his electric-light apparatus in the hands of the Telegraph Supply Company,

of Cleveland, O., and this company, for the purpose of facilitating its introduction and sale, have established agencies in the various large cities. The Brush Electric Light Co. of New England, No. 17 Pemberton Square, Boston, have charge of the New England agency, and the Brush Electric Light Co., 231 Broadway, New York, and Brush Electric Light Co., 924 Chestnut street, Philadelphia, have charge of the territory of which these cities are the centers. The Telegraph Supply Co., of 903 Battery street, San Francisco, are the agents at that point.

ANSWERS TO METALLURGICAL QUERIES.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In compliance with your request for answers to queries published in your issue of Dec. 7th, I would offer the following suggestions:

As fluid amalgams are strictly solutions, it is reasonable to infer that any of the physical influences that tend to concentrate solutions of solids would exert parity of action on gold dissolved in mercury.

The osmotic action, for example, of porous septa implies that porosity does not always insist that solutions should be imbibed as through a filter-paper. It is suggested then, that the straining action of buckskin does not negative the existence of mercury as a true solvent, although the said action, admitted a physical one, may not be referable to osmose. The separation of mercury from gold, however, is probably due to the "wetting" action of mercury on the pores of the buckskin, permitting compression to force the wetting material through the skin.

In cupellation, bone-ash becomes "wetted" by litharge, but not by fluid metals. The oxidizable metals, therefore, together with the litharge, have, by capillarity of the bone-ash, their molecular adhesion with the fluid metals overcome, and are consequently imbibed.

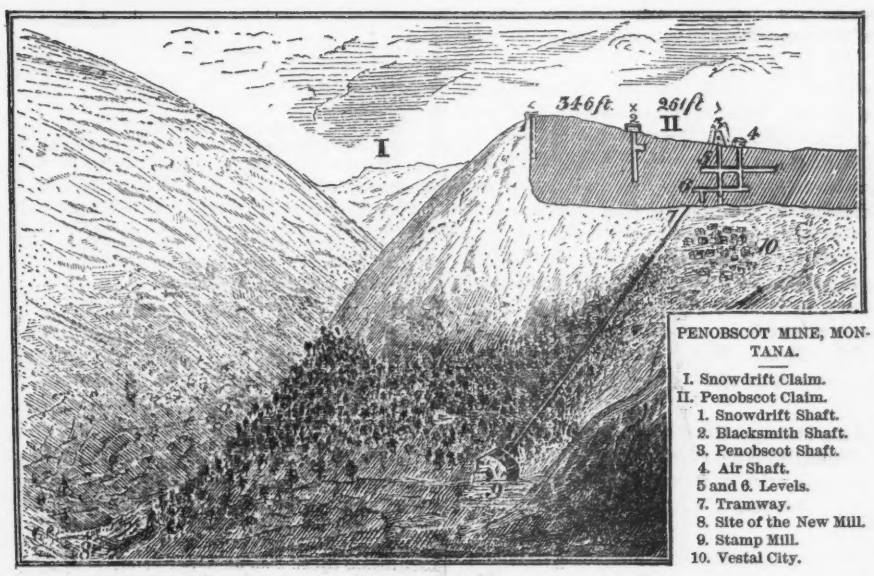
CAÑON, Dec. 12, 1878. E. MALLETT, JR.

THE PENOBSCOT-SNOWDRIFT MINE.

About three months ago a company was formed under the laws of Montana, with the corporate title of the Penobscot and Snowdrift Consolidated Gold Mining Company, for the purpose of working the mines of the same names in Montana. The capital stock of the company is $500,000, divided into 100,000 shares of $5 each. The stock was subscribed for at par.

The principal organizer of this company was Capt. Wm. B. Frue, who was one of the original movers of the Silver Islet Company, a description of which is published in this number of the JOURNAL.

According to the latest advices received, the main shaft of the Penobscot mine was down 160 feet, sunk the full width of the vein—14 feet. The first level was driven 55 feet west and discontinued, and to the east it has been driven 96 feet, and is in excellent ore. The second level has been driven east 60 feet, and west 122 feet in good ore. A winze on the second level west, 60 feet from shaft, is being driven to meet a future third level. Every opening so far is in excellent ore, the vein varying from 12 to 16 feet wide.



PENOBSCOT MINE, MONTANA.

I. Snowdrift Claim.
II. Penobscot Claim.
1. Snowdrift Shaft.
2. Blacksmith Shaft.
3. Penobscot Shaft.
4. Air Shaft.
5 and 6. Levels.
7. Tramway.
8. Site of the New Mill.
9. Stamp Mill.
10. Vestal City.

At 38 feet from the Penobscot shaft, an air-shaft has been sunk 100 feet, connecting with first and second levels east. This was sunk full width of vein, about 13 feet. The Blacksmith shaft is down 53 feet, in excellent hard quartz ore, averaging $33.50 per ton. The Snowdrift shaft, which is 40 feet higher than the other workings, is sunk to a depth of 72 feet, all in good white quartz, paying ore.

There are 20 stamps and four Frue vanners in operation. It is proposed to erect a larger mill on the other side of the mountain in the spring, and to get the ore from a proposed tunnel on line of vein.

Since the company came into possession of this property, its efforts have been to increase its developments and to get every thing working systematically. Nevertheless, the net product for October and November was over $35,000. From present indications the mines will produce at least the same amount per month and it is expected to pay five per cent per month, beginning early next year, and the belief is expressed that even this amount may be increased.

The above is an approximate plan of the workings.

COLORADO.

Special Correspondence of the Engineering and Mining Journal.

ROSITA, CUSTER COUNTY.

The Humboldt is still sinking its main shaft. The new engine has proved perfectly successful. It has double reversible cylinders, 10″ diameter, 16″ stroke, of 50 horse-power; the rope, flat wire, 2″ × ⅝″, is wound on spindles. The whole work, together with two boilers of 65 horse-power, came from the shops of Fraser, Chalmers & Co., Chicago. The shaft is now 512 feet deep. This shaft was in good pay to a depth of 425 feet; since then some slight interruptions of ore-body and of regularity of pitch have occurred. The last 30 feet have been in ore of equal grade to that found above. Sinking will be continued until a depth of 600 feet is obtained before stoping will be recommenced.

The Custer County Tunnel, now over 200 feet long, is occasioning much talk and excitement in town. The heading is in pay rock.

The Ben Franklin is said to have struck the largest ore-body yet found on the property.

The Maine mine is working but a small force, its hoisting-engine not yet having left the shops of Jackson, Denver. Samples taken from the present bottom of the shaft assay 20 to 30 ounces gold.

The excitement at Silver Cliff has drawn attention to some of the older discoveries at Rosita, resulting in the sale of several. Among these are the Leavenworth mine. Twelve hundred feet of this property have been bought for $14,000, Mr. John N. Winders, of Denver, being the fortunate purchaser. Up to last summer the workings yielded ore of very high grade. The work, although very limited, was well done. From 89 square fathoms mined, 91 tons were shipped, yielding in value $8581, for which were received from the mills $5162; these figures yielding $96 for value of square fathom, and $94 average per ton. During this autumn's work, the mine was leased to three men. Within two months they received from the mills $3000, still using the old horse-whim. The ore mined by them yielded for first-class, 365 oz.; second class, 200 oz.; third class, 70 oz. silver. The 300 feet of property retained on the east end is now being developed by the original owners. Ore-bodies are being opened. It is probable that this last work will develop the Minnesota vein as well.

One half of the Cymbeline, at present an undeveloped property, has also been sold, for fair figures. The purchase-money is to be used in extensive development.

N.

PNEUMATIC DRYING-MACHINE FOR MINERALS.*

By Riehn, Meinicke & Wolff.

The appearance and principal working parts of this machine—hutches, sieves, and plungers—are similar to those of a continuous jigging machine, as used for the finer sizes of mineral in ore or coal dressing; but the hutch, instead of being entirely, is only partially, filled with water, so that a space filled with air is inclosed below the plunger and sieve bottoms. The material to be dried, such as purified slack from coal-washing machines, is received upon the sieve in a layer of about 6 inches deep, and is traversed slowly forward by a screw creeper running along the whole length of the machine. The three plungers, one to each sieve, are mounted on a shaft by eccentrics, and receive motion by a crank and lever combination, so that the down-stroke is made more rapidly than the up-stroke. As the piston descends, the air standing above the water is compressed to an amount regulated by loaded spring valves on the sides of the hutch, and the layer of mineral is loosened upon the sieve, the holes in the latter being cleared from any particles of mud that may have lodged in them. On the return stroke the piston acts as an exhauster, and the external air, rushing through the layer of mineral to compensate for the partial vacuum formed, carries away a considerable portion of the adherent water. The sieves used must be of a very fine mesh, so as to be practically impermeable to the mineral while allowing a free air-way. The water level, as well as the discharge of any particles of mud that may pass through the sieves, is regulated by siphons fixed at particular levels in the side of the hutch. This machine has been adopted at the Sulkow coal mine near Pilsen, in Bohemia, for drying washed slack, the particles gauging ⅛ of an inch and below. The sieves are made of fine hair-cloth, and the material leaves the machine sufficiently dried to be fit for charging in the coke ovens.

THE VALUE OF ASBESTOS FOR PIPE COVERINGS.—Dr. Egbert Guernsey, of the Homeopathic Asylum for the Insane at Middletown, N. Y., says within the past year they have saved nearly two hundred tons of coal by using H. W. Johns' Asbestos Pipe Coverings.

INDIAN RAILWAYS.—In India there are now 7551½ miles of railway in operation, of which 492½ were completed during the year 1877 and 223 since the close of the year. There are 806½ miles laid with a double line, 5915¾ miles are constructed of the 5 ft. 6 in. gauge, and 1638¾ on narrower gauges. The most important operations have been connected with the state lines, to which 580 miles have been added. The line which proceeds through Northern Bengal toward the hills at Darjeeling, the Dhond and Mammad, and that between Rangoon and Prome, have been opened for traffic. The Punjab northern line has also been finished to Jhelum and the South Indian has been extended 132¾ miles.

GUATEMALA RAILWAY.—A railway is required in Guatemala, and the government proposes to encourage its construction. It offers a cash advance of £42,000—to be repaid in installments from the dividends after the road is completed—payable in sums of £5000 on every three miles during the progress of the work. It also guarantees to the stockholders a yearly profit dividend of 12 per cent per annum on a fixed cost of £200,000. The customs revenue of the country is specially pledged for security of this dividend for twenty-five years, and yields £300,000 per annum. In addition, the government allows to the property of the company immunity from all taxation, internal or external, for ninety-nine years.

*Abstract of a paper in the *Oesterreichische Zeitschrift für Berg- und Hüttenwesen*, xxvi., p. 95. From the Proceedings of the Institution of Civil Engineers of London edited by James Forrest, Secretary.

THE ENGINEERING AND MINING JOURNAL FOR 1879.

El primero de enero próximo el ENGINEERING AND MINING JOURNAL comenzará su vijesimo-septimo volúmen; y con perdonable orgullo y satisfaccion notamos el hecho de que durante esos años ha mantenido su puesto como el diario minero de mas influencia y circulacion en América. En los últimos cinco años ha absorvido dos importantes publicaciones técnicas, el *Coal and Iron Record*, de Nueva York, y el *Mining Review*, de Denver, Colorado, aumentando al mismo tiempo un gran número de suscritores á los de ambas publicaciones. Su actual circulacion es mucho mayor que la de ningun otro periódico de minas en América.

El JOURNAL tiene por objeto promover la produccion mas económica de los minerales útiles y sus aplicaciones, asegurando á la vez el bienestar de los que se ocupan de estas industrias.

Al llenar esos fines, procurará combinar los informes ó datos esencialmente técnicos, útiles para los mas entendidos é ilustrados ingenieros y metalúrgicos, con los conocimientos elementales é informaciones diarias de aplicacion práctica, que son de interés é importancia para los hombres empeñados en impresas industriales; sea como obreros, directores, superintendentes, corredores comerciantes ó capitalistas. Nuestros esfuerzos tenderan á hacer el JOURNAL *prácticamente útil*, popular é interesante á dichas personas; sin por esto sacrificar la exactitud á la bambolla, ni llenar sus páginas con locas fantasias, teorias grotescas ó descripciones á la Munchausen, que muchas veces pasan por "ciencia" ó por "importantes informes mineros."

Sus datos técnicos y científicos proceden de las mas altas autoridades en cada departamento y tienden á ser siempre de importancia práctica. Sus datos financiales y comerciales son obtenidos de las mas entendidas y respetables fuentes, sin ninguna injerencia de intereses personales ó especiales. Siendo su tema la mas completa independencia, y veracidad como guia de los negociantes y capitalistas, la plena confianza de que disfruta y la basta influencia que ejerce en los círculos financiales y mercantiles, son la mejor prueba del buen resultado de sus esfuerzos.

En sus páginas se encontraran descritos y bellamente ilustrados todos los sistemas de trabajos en minas de carbon y metales; máquinas de minas y molinos de todo género; hornos y aparatos para estraer y manufacturar metales. La preparacion del gas (especialmente el gas combustible) y de la luz eléctrica encontrará cabida en ellas. Todos los paises y todos los idiomas seran puestos á contribucion para suministrar los conocimientos que promueven el progreso de los objetos espresados y agranden la prosperidad de la nacion.

No menos empeño tomará el JOURNAL en ser interesante y útil al trabajador como al injeniero. Sus páginas contendran correspondencias especiales de todas las regiones minerales de América. Prestará particular atencion al acopio de datos sobre el trabajo, dando cuenta de la proporcion de salarios pagados en las diferentes partes del globo, de los esfuerzos que se hagan en promover cooperaciones, arbitramentos y otras medidas que tiendan á mejorar la clase obrera.

Honradez, justicia y tolerancia son los específicos contra las huelgas; y la adopcion de medidas para la mejora del estado de los trabajadores, promoviendo economia y ahorro de sus ganancias, y disminuyendo los gastos de mantencion, son asuntos tan importantes para el empleado como para el empresario.

El mantener un interes permanente en las inversiones hechas legitimamente en minas, es siempre de particular importancia para el ENGINEERING AND MINING JOURNAL, que se empeña en inculcar principios de prudencia y circunspeccion al efectuar esos desembolsos, así como una honrada y hábil administracion en lo que toca á la parte técnica y financial en las minas y compañías mineras; puntos que son el fundamento esencial para un provechoso trabajo mineralógico.

El ENGINEERING AND MINING JOURNAL no tiene alianzas que lo embaracen. No depende de interés alguno especial, ni menos es el órgano de ninguna camarilla. Ha sido siempre el enemigo intransigente de todo procedimiento deshonesto ó reprobado; sea que aparezca dorado con los millones de los *bonanzas* ó representen el azar de media pesata en acciones de fantásticas propiedades mineras.

Con la firme conviccion de que las empresas mineras, prudente y honradamente manejadas, son las mas provechosas que se pueden tentar, y con el conocimiento de que este pais posee minas cuya riqueza no ha sido jamas sobrepasada por las de parte alguna de la tierra, podemos invocar ardientemente esos principios como la base de la mas importante industria que exista en el pais.

WIRE ROPE AS A SUBSTITUTE FOR CHAIN CABLE.—Two of our largest manufacturers of wire rope offer to rig a ship free of expense, including Manton's patent windlass, for the purpose of demonstrating the superiority of wire rope as compared with chain cable. The offer is made by Roebling's Sons and by J. Lloyd Haigh. The latter, a few days ago, completed his contract for the delivery of 7,000,000 pounds of wire for the rope of the Brooklyn Bridge, at a cost of $600,000.

The introduction of wire rope for ships' cables is much discussed at the present moment, both in England and the United States. In 1812, the clumsy hemp hawser was displaced by the chain cable, and it is claimed that the revolution thus brought about within the last sixty years in the equipment of ships is no greater than would result from the adoption of wire rope. The merits of the latter, however, remain to be tested in practical navigation.

IMPORTS AND EXPORTS.

Below we give a table compiled from the official statement of the exports and imports of the United States for the month of September and 9 months ending the same:

COMMODITIES.	VALUES. Month ending Sept. 30th.		Nine months ending Sept. 30th.	
	1878.	1877.	1878.	1877.
Brass, and m'f'r's of ...	$20,789	$19,060	$193,845	$194,555
Coal, bituminous ...	177,836	234,934	1,484,658	1,128,125
Copper, and m'f'r's of ...	28,704	37,392	283,289	461,201
Iron and steel, and m'f'r's of ...	736,103	828,395	6,490,880	6,793,520
Lead, and m'f'r's of ...	8,116	71,515	61,027	646,815
Metals, and m'f'r's of ...	88,469	102,998	545,795	643,176
Salt ...	181,176	143,062	1,148,626	1,216,731
Tin, and m'f'r's of ...	599,699	801,504	6,713,763	7,886,090
Zinc, and m'f'r's of ...	6,328	12,636	77,616	98,112
Total values ...	1,847,220	2,251,560	16,999,499	19,068,325
EXPORTS.				
Brass, and m'f'r's of ...	$120,842	$5,976	$599,122	$323,636
Coal, anthracite ...	91,857	92,943	844,352	1,014,359
Coal, bituminous ...	125,703	97,336	907,423	830,864
Copper, and m'f'r's of ...	220,440	337,308	2,023,308	2,003,530
Iron, and m'f'r's of ...	767,791	776,792	7,280,649	6,581,709
Steel, and m'f'r's of ...	147,804	221,097	2,113,918	5,287,817
Lead, and m'f'r's of ...	38,978	2,671	409,388	42,978
Quicksilver ...	44,221	181,088	766,710	1,483,326
Salt ...	1,272	2,396	13,953	16,655
Zinc, and m'f'r's of ...	36,309	34,673	217,509	182,972
Total values ...	1,595,417	1,752,280	15,176,332	17,767,846

NOTES.

GERMAN PETROLEUM.—Near Heide, in Holstein, a flowing well of petroleum has been struck, the product of which is said to be in every way equal to what comes from America.

SALARIES OF THE FRENCH PROFESSORS OF THE FACULTIES.—It is very properly pointed out as unfair that while the salaries of professors in the faculties of law and letters have been fixed at 15,000 francs, those of the professors of medicine and science receive only 13,000.—*Les Mondes.*

MINERS CHEWING COCA-LEAVES.—We present on one of our supplement sheets the view of a group of Peruvian miners engaged in masticating coca-leaves. These leaves, sun-dried and pressed, have a mild sedative influence, and are credited with increasing the power of endurance and sustaining the strength during long periods of abstinence.

NICKEL JEWELRY.—The French seem to be quick in recognizing the merits of a substance for decorative purposes. They are now making jewelry from nickel ore. The ore from the famous New Caledonia nickel mines has recently been put on the market under the name nouméite, in the shape of brooches, ear-rings, etc. It is grayish green, and has been extensively used by Christofle & Co.

RAILWAY PARCEL EXPRESS STAMPS.—A circular has been issued by Mr. A. Atkinson, which states that twenty-five railway companies of England, Scotland, and Wales have resolved that from and after the 1st of January next, they will issue railway stamps of the value of 4d. and 8d., which shall carry parcels of 2 lbs. and 4 lbs. respectively throughout their whole systems, and that they have agreed to accept parcels of these weights and rates throughout the whole of their systems, and to grant an insurance up to 20s. at these rates, thus placing all the stations on these twenty-five companies at the command of the public for the receipt and delivery of parcels not exceeding 4 lbs. in weight.

APPARATUS FOR FEEDING BOILERS.—Signor Chiazzari, of the Alta Italia Railway, has recently described a new apparatus for feeding the boilers of locomotives and other non-condensing engines with water heated to within a few degrees of the boiling-point. The apparatus consists in bringing the feed-water in a finely-divided spray into contact with a portion of the exhaust steam during its passage through the feed pump, and of an automatic arrangement for shutting off the supply from the tender the moment the regulator is closed, thus preventing the admission of cold water to the boiler. Mechanically the pump appears to be successful, as it has worked without trouble since January, 1876. Economically it seems also to have answered, for the saving in fuel, in a trial of four months, is said to have been very large.

GOOD WORK AT THE LACKAWANNA STEEL WORKS.—The steel works at Scranton, Pa., made in November, in twenty-five and one half turns, 5477 tons, 11 cwt. of ingots, or an average per turn of 214 tons, 16 cwt. This is believed to be the largest month's average per turn ever yet made by two converters anywhere in the world. The steel rail mill made in November, in twenty-five and one half turns, 4314 tons, 6 cwt. of first-quality rails, or an average per turn of 169 tons, 3 cwt. This is claimed to be the largest month's average per turn ever yet made anywhere in the world on one rail train. More than one half the above was on light fifty-pound rails.

The amount of this product will be better appreciated when it is stated that the steel works and mill are running single turn, or half time—that is, days only, and not night and day.

AMBER VARNISH.—S. Meredith prepares a varnish which gives a very fine polish, and which is especially valuable for carriages and for choice furniture. He puts 7 pounds of amber in a clay crucible, with 14 pounds of rock-salt, adding water enough to dissolve the salt. He then adds more water, and keeps the crucible over a fire until the amber becomes perfectly white. The bleached amber is put into an iron pot, and warmed over an ordinary fire until it is completely dissolved; the pot is then allowed to cool, and the amber is placed in a stream of water, to remove the salt; it is then reheated until it dissolves, when it is poured on a marble table to evaporate the water, and then exposed to a greater heat to

drive off all moisture. This bleached amber is powdered, and then melted in an iron pot. Fine nut-oil is added, and stirred until the mixture is complete. The pot is then removed from the fire, and, when sufficiently cool, spirits of turpentine is added to produce the proper consistency. The following proportions are recommended: White amber, 1 lb.; fine nut.oil, 1 lb.; spirits of turpentine, 2 lbs.—*Les Mondes, trans. in Jour. Franklin Inst.*

THE ENGLISH STEEL SHIP.—It seems that the steel ship built by the British government is a success, and the London *Times* says that "whatever doubts may have been entertained with respect to the speed performances of the Iris, steel dispatch vessel, were conclusively set at rest by the long and varied trial to which she was subjected on the measured mile in Stokes Bay. She was proved to be not only the quickest ship in the navy, but the quickest ship afloat, having surpassed the highest speed realized by the Lightning, torpedo vessel, and even outstripped the most sanguine expectations of Mr. Barnaby, her designer." We read that the Iris was in every respect an essentially experimental craft. There was nothing resembling her in the service with reference to the proportion of midship section to length, the extreme fineness of her entrance and run, and the ratio of her enormous horse-power to displacement; and, as a result, there were only very imperfect data to guide the Constructive Department as to her probable performances from the actual performances of previously existing ships. The ship was trimmed by ballast and coal to 15 feet 8 inches forward and 20 feet 6 inches aft, which was near about her load-line; and the new experimental four-bladed screws were 16 feet 3 inches in diameter, and had a pitch of 20 feet. The blades were smoothed to prevent friction, and conical caps had been tapped into the bosses over the nuts which secure the screws to the shafts for the purpose of preventing the wave which has been found to follow a bluff ending, whereby the resistance against which the ship has to contend in passing through the water is augmented. The result of the trial was in every respect more than satisfactory. Four full-power runs were made on the mile with the following surprising results: Steam at engines, 62 lbs.; vacuum, 27 inches; revolutions, 96 starboard and 98 port; horse-power, 7734·85; speed of vessel, 18·572 knots. The engines thus developed fully 700 horses more than the contract, while the ship realized two knots in excess of the speed obtained from the larger screws, and fully a knot more than the Constructive Department anticipated to get out of her.

ST. GOTHARD TUNNEL.—Two years from this time, the great St. Gothard tunnel through the Alps, uniting Switzerland and Italy, must either be completed, or the contractor, Mr. Favre, will have a heavy penalty to pay. Under the terms he must pay $1000 for every day later than October 1st, 1880, on which it remains unfinished. If six months afterward it is still uncompleted, he loses $2000 per day; and if 12 months go past without its being turned over, he forfeits every thing, including his bond of $1,600,000. The undertaking is a gigantic one, and some engineers doubt if Favre is not badly beaten at last. The main tunnel is over 29,000 feet long, and the work on it is only prosecuted under tremendous difficulties. All the power used in drilling is furnished by compressed air, which is prepared outside by powerful pumps and stored up in vast tanks. The locomotives which draw from the tunnel the blasted rocks are also run by compressed air, as the use of steam in such a hole would be impossible. As it is, the men at work often suffer excessively from the foul vapors, partly natural and partly produced by the explosions of dynamite, which are so constant that an observer compares them to cannon firing in a battle. These gases would collect and be fatal, except that that the exhaust air from the drills is employed to drive them toward the mouth of the excavation. Favre is laboring with splendid energy, and the working force is as large as can be put on. It is vastly to his interest to hurry, for he will receive a bonus of $1000 for each day previous to October 1st, 1880, on which he has his task finished. The tunnel will cost about $55,000,000, although when it was first undertaken the estimates were some twenty millions less than the above figures. The discrepancy was occasioned by engineers' mistakes, and when it was found that the enterprise would be much more expensive than originally announced, the discovery nearly discouraged all concerned. But the Swiss, Italian, and German governments increased their subventions, private subscriptions were stimulated, and financial success was assured. The laborers employed are Italians, about the only workingmen who could be employed at the small wages paid, averaging from 60 cents to $1.25 per day. A writer speaks of them as the Chinese of Europe; but we doubt if even John would not demur at being asked to do such laborious, exhausting, and dangerous work for the same amount of pay.

ELECTRIC NOTES.

EDISON'S CLAIM TO AN ENGLISH PATENT SECURED.—The British Commissioners of Patents have decided favorably on Mr. Edison's claim to a patent for his mode of producing, subdividing, and distributing the electric light.

HOW EDISON'S LIGHT IS PRODUCED.—The light is produced by incandescence. The conductor, which is made incandescent by the electrical current passing through it, is a small, curiously-shaped apparatus, consisting of a high alloy of platinum and iridium, which can not be melted under 5000 degrees Fahrenheit. A sufficient quantity of this metal is placed in each burner to give a light equal to that of a gas jet.

THE ELECTRIC LIGHT PUT OUT.—Several American manufacturers who had introduced the electric light into their works, have withdrawn it, owing to the intermittent character of the light used, thus injuriously affecting the optic nerves of the workmen, interfering with a steady gaze. This intermission is not unfrequently due to the engine employed for working the generating machine being employed for other operations, and is not a necessary feature of electric lighting.

A NEW DETECTIVE.—A gentleman living near Calcutta has discovered a new practical use for the microphone, which promises to render it useful in the detection of crime. Having for some time missed oil from his godown, he fixed up a microphone near the oil cans, carrying the wire up stairs to his bed-room, and after the house had been closed for the night, sat up to await the result. He was not long waiting before he heard the clinking of bottles, followed by the gurgling sound of liquid being poured from one receptacle to another. Hastening down he caught his bearer *in flagrante delicto*, filling small bottles with oil for easy conveyance from the premises.

COLOR OF THE ELECTRIC LIGHT.—By the combination of the suitable chemicals during the manufacture of the carbons, or by saturation afterward, almost any colored tint may be obtained. The natural violet rays are neutralized by the addition of a few grains in each carbon of chloride of sodium, producing a yellow tint like the sunlight. Magnesia produces a very white light, and is well adapted to photography. A mixture of arsenic, on the contrary, produces a light almost devoid of chemical effect. Various proto-salts and sulphates of the metals may be so combined as to produce almost any desired color.

DIVISION OF THE ELECTRIC LIGHT.—The mode in which this is effected is by parting a large wire into numerous branches, each branch of the same length and conducting power, and receiving an equal proportion of the current. The branches are further subdivided, and the supply of the lateral stems similarly regulated. In practice, Mr. Edison will make use of two large main wires of copper, one for the outflow of the current from the machines, the other for its return. The mains will not be united at the outer ends. The positive wires will throw out a branch into each building it passes which takes the electric light. This branch will return to the negative main, thus completing the circuit. It is expected that the current can thus be subdivided any number of times. The mains are to be supplied with a deluge of electricity, if the expression may be allowed, generated by magnetic machines, built for quantity and not for intensity, and it is expected that each building will receive its proportional share of the current. A subdivision of the current has been patented, by which the lights are placed in branch circuits, running across from the positive to the negative conductor; any number which the machine will support may be used and governed by switches.

GENERAL MINING NEWS.

Our usual special correspondence from various mining districts is crowded out this week.

DAKOTA.

The Father De Smet Company has ordered two 80-stamp mills. This company is said to be crushing over 300 tons of ore per day.

Six leading California companies in the Hills are reported to have invested in claims and machinery, and to have ordered additional machinery, aggregating in all nearly $1,750,000.

The ores being worked average from $9 to $23 per ton. The production of gold is limited only by the milling capacity of this district, which, at the present time, is about 1000 stamps. This number will, however, be largely increased by spring, and the Hill's production of gold in 1879 will add much to the country's wealth.

GEORGIA.

Although Georgia has, as a rule, very low grade ore to mill, yet the cheapness of labor makes gold mining in many instances fairly profitable. The local press speaks very favorably of the appearance of Findley. The *Mountain Signal* of Dahlonega, estimates that the improvements made in Georgia during this year in the development of the gold fields have cost $200,000. During the last week of November there were 1000 tons of ore reduced at Dahlonega.

NEW PATENTS.

The following is a list of the new inventions relating to Iron, Coal, Mining Machinery, Chemical Apparatus, and the treating of Precious Metals, etc., from *The Official Gazette of the United States Patent Office*, for the week ending November 12th:

No. of Patent.	*Title of Invention.*	*Name of Inventor.*	*Residence.*
209,745	Dumping-Wagon	Hamilton Bailey	Harrisburg, Pa.
209,747	Machine for Making Sheet-Metal Roofing	Jane Belt,	Mt. Washington, O.
209,750	Steam-Engine	Charles H. Burton	Cleveland, O.
209,753	Tire-Heating Furnace	Anthony Doll	Buffalo, N. Y.
209,756	Ditching-Plow	John M. Fudge	Niles, Ind.
209,765	Shaft-Coupling	August Loehner (a)	St. Louis, Mo.
209,789	Ore-Washer	T. T. Allen	Denver, Colo.
209,816	Gauge-Cock	Erastus B. Kunkle	Ft. Wayne, Ind.
209,817	Railroad-Rail	Louis Leypoldt	New York, N. Y.
209,821	Revolving Ore-Roaster	James Manes	New Haven, Ct.
209,838	Mill for Grinding Ore	William C. Salmon	Portland, Or.
209,873	Water-Wheel	William H. Elmer	San Francisco, Cal.
209,882	Water-Gate	P. Giovannini	San Francisco, Cal.
209,891	Electric Gas-Burner	Charles H. Hinds	New York, N. Y.
209,895	Steam-Boiler	T. C Joy	Titusville, Pa.
209,896	Ore Stamp	Stephen Kendall (b)	Jackson, Cal.
200,898	Smoke-Consuming Device for Furnace	William M. Kirby	Pittsburg, Pa.
209,905	Gas-Regulator	Miles Lees	Providence, R. I.
209,942	Reflecting-Galvanometer	William Thompson	Glasgow, Scotla'd
209,943	Oil-Still	Ole Tilton	Pittsburg, Pa.

(a) Assignor of half his right to John B. Reilly, same place.
(b) Assignor of half his right to John A. Eagon and T. J. Phelps.

PROPOSED AMENDMENTS TO TH: PATENT LAW.—There is a general consensus of opinion that the Patent Law, excellent as it is in its general scope, requires amendment, more particularly in protecting the adopters of patented inventions from continuous liability to have vexatious actions brought against them on the ground of infringement, no matter how long a period may have elapsed. In the bill for amendment now before Congress, a limitation of time is provided, within which such actions may be brought; further, for the rule determining the assessment of damages, and which is found to be inequitable in its working, is to be substituted that of the commercial value of the invention, estimated by a reasonable number of ascertained business transactions under the patent. Proceedings to annul invalid patents are provided for. Non-payment of the second and third fees is to work a forfeiture; this provision telling on many patents, useless as practical devices, which are useful only as the basis of infringement suits. The contents of patent licenses that have been destroyed or lost are to be permitted to be proved. Other specific provisions tend to afford additional facilities to inventors.

ASSAY DEPARTMENT OF THE ENGINEERING AND MINING JOURNAL.

This department is opened for the benefit of miners, prospectors, and others interested in minerals.

Replies will be made in these columns, and *without charge*, to questions asked regarding the nature and commercial value of minerals, and of samples sent.

Assays determining the actual composition and value of ores will be made at the following rates. All assays are made with the utmost care by the most experienced and competent assayers:

Assay for Gold	$2.00	Assay for Copper	$2.00	Assay for zinc	$3.00
" Silver	1.50	" Lead	1.50	Zinc analyses	5.00
" Gold and silver	2.00				

The amount should invariably accompany the order, and expressage or postage must always be prepaid.

Communications, samples, etc., to be addressed to

ENGINEERING AND MINING JOURNAL, 27 Park Place, New York.
(P. O. Box 4404.)

ANSWERS.

CCV. F. L., New York.—Sample of ore contains silver 507·8 oz.; gold, 1·35 oz. per ton of 2000 lbs.

CCVI. J. O. J., Newton, Mass.—Samples of ore contain, No. 1, gold traces only; No. 2, gold 14·6 oz. per ton of 2000 lbs.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative statement for the week ending Dec. 14th and years from January 1st:

Tons of 2240 lbs.	1878. Week.	1878. Year.	1877. Week.	1877. Year.
Wyoming Region.				
D. & H. Canal Co..	46,479	2,044,720	59,666	1,801,556
D. L. & W. RR. Co.	42,557	2,063,843	69,650	1,924,448
Penn. Coal Co.....	9,194	885,262	23,787	1,000,035
L. V. RR. Co.....	16,269	801,129	16,910	869,697
P. & N. Y. RR. Co..	463	30,958	350	42,093
C. RR. of N. J.....	27,024	940,703	42,057	1,297,382
Penn. Canal Co....	342	347,599	808	353,194
	142,328	7,094,214	213,228	7,288,405
Lehigh Region.				
L. V. RR. Co.....	49,679	2,353,075	67,182	3,224,257
C. RR. of N. J.....	30,637	1,293,770	38,583	1,465,994
D. H. & W. B. RR..	195	37,848	1,280	34,473
	80,511	3,684,693	107,045	4,724,724
Schuylkill Region.				
P. & R. RR. Co.....	91,451	4,900,529	147,773	6,571,593
Shamokin & Lykens Val.....	21,303	771,626	12,107	691,342
	112,754	5,672,155	159,880	7,262,935
Sullivan Region.				
Sul. & Erie RR. Co.	1,150	35,026	654	20,377
Total	336,743	16,486,088	480,807	19,296,441
Increase.....	.....	.....	.....	.....
Decrease	144,064	2,808,353	.....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent of the whole production.

Belvidere Delaware Railroad Report for week ending Dec. 14th:

	Week.	Year. 1878.	Year. 1877.
Coal for shipment at Coal Port (Trenton).....	11	14,238	60,512
Coal for shipment at South Amboy	7,940	423,637	524,820
Coal for distribution.....	5,749	191,234	192,410
Coal for Company's use.....	1,725	80,442	68,150

Coal Creek Mines, Colorado.—Shipments for week ending Dec. 7th, 1940 tons.

Shipments of Anthracite Coal during week ending December 7th, 1878, and total for year to date, compared with corresponding time last year, as prepared by Mr. John H. Jones, Accountant of the Anthracite Board of Control.

Interests.	Week. Tons.	Week. Cwt.	Total for year to date. Tons.	Total for year to date. Cwt.
Philadelphia & Reading R.R.	2,912	5	4,775,835	18
Lehigh Valley R.R.....	86,608	5	3,222,330	0
Central R.R. of N. J.....	44,594	14	2,065,024	19
Del., Lack. & West. R.R....	59,456	11	2,032,679	11
Del. & Hudson Canal	48,706	1	1,890,700	9
Pennsylvania R.R	28,538	7	1,281,288	6
Pennsylvania Coal Co.....	14,555	9	908,472	9
Total.....	285,371	12	16,176,331	12

Interests.	Corresponding time last year. Tons.	Corresponding time last year. Cwt.	Difference. Tons.	Difference. Cwt.
Phila. & Reading R.R..	6,412,331	14	D. 1,636,495	16
Lehigh Valley R.R.....	4,196,378	9	D. 974,048	9
Central R.R. of N. J....	2,570,518	0	D. 505,493	1
Del., Lack. & West. R.R	1,973,965	10	I. 58,714	1
Del. & Hudson Canal....	1,782,102	0	I. 108,598	9
Pennsylvania R.R.....	1,446,375	0	D. 165,086	14
Pennsylvania Coal Co...	1,032,833	0	D. 124,360	11
Total.....	19,414,503	13	D. 3,238,172	1

Note.—The tonnage for the week on this statement is approximated from the weekly returns of the transportation companies, and is subject to adjustment each month to conform to the returns made by each interest to the Board of Control

The increase of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania railroads amounts to 109,625 tons, as compared with the corresponding period in 1877.

Receipts and shipments of coal at Chicago Ill., for the week ending Dec. 14th, and year from January 1st:

	Week. Tons.	Year. Tons.
Receipts.....	33,413	1,758,204
Shipments.....	7,659	281,574

Perth Amboy Business:

	Tons.
Received for the week	29,615
Shipped for the week.....	14,940
On hand Dec. 14th.....	98,286

The Production of Bituminous Coal for the week ending Dec. 14th was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2,240 lb.....	20,541	1,620,115
Barclay Region, Pa.		
Barclay R. R., tons of 2,240 lbs.....	6,140	292,880
Broad Top Region, Pa.		
Huntingdon and Broad Top R. R.....	2,483	144,544
*East Broad Top.....	1,315	61,048
Clearfield Region, Pa.		
*Snow Shoe.....	491	27,791
*Tyrone and Clearfield.....	26,855	1,219,251
Allegheny Region, Pa.		
*Pennsylvania R. R	2,732	193,515
Pittsburg Region, Pa.		
*West Penn R. R.....	3,046	177,636
*Southwest Penn. R. R.....	461	22,903
*Penn & Westmoreland gas coal, Pa. R. R.....	17,455	659,808
*Pennsylvania R. R.....	7,773	411,893

*For the week ending Dec. 14th.

The Production of Coke for the week ending Dec. 14th:

Tons of 2000 lbs.	Week.	Year.
West Penn. R. R.....	2,491	83,310
Southwest Penn. R. R.....	15,773	756,151
Penn. & Westmoreland Region, Pa. R. R.	1,934	74,644
Pittsburg, Penn. R. R.....	2,829	112,074
Penn. R. R. (Allegheny Region).....	1,408	2,490
Total.....	24,435	1,028,669

COAL TRADE REVIEW.

New York, Friday Evening, Dec. 20, 1878.

Anthracite.

The Delaware, Lackawanna, and Western Railroad Company announced its auction sale to take place a week earlier in the month than usual, and on Wednesday 100,000 tons of coal were offered. The following quantities of the various sizes were disposed of, and the accompanying average prices received, comparison being made with the prices received at the previous sale:

Tons.	Average prices Dec. 18th.	Average prices November.
5,000 steamer.....	$2.41½	$3.20
20,000 broken.....	2.55	3.23
20,000 egg.....	2.67½	3.23¾
40,000 stove	2.98	3.71
15,000 chestnut	2.42½	3.07
100,000 General average....	$2.72	$3.43

The sale of this week shows a decline of 71c. as compared with the previous sale, although the decline is not so great; for the November sale was, without question, made to register higher figures than the actual condition of the market warranted. Wednesday's sale showed prices lower than four of the sales in 1877, when there was open competition, and was only 2c. per ton higher than the average of all the sales last year. This is certainly a good beginning for a free fight, and from all indications the sale a month hence, if not tampered with, and if the quantity offered be a large one, must show prices about as low as we have ever seen.

The effect of the auction sale has been to settle prices to whatever can be secured for coal. The Pennsylvania Coal Company has issued a circular to the trade containing the following prices f. o. b. Weehawken.

Steamer.....	$2.60	Stove.....	$3.05
Grate.....	2.60	Chestnut.....	2.60
Egg.....	2.60	Small chestnut.....	2.00

It issued but one circular in 1877 containing lower prices.

The Lehigh and Wilkes-Barre Coal Company quotes f. o. b. Port Johnston, as follows:

	Lump.	Steamer.	Broken.
Honey Brook Lehigh.....	$3.25	.....	$3.00
Wilkes-Barre.....	2.60	$2.60	2.70
Plymouth Red Ash.....	.....	.....	2.70
	Egg.	Stove.	Chestnut.
Honey-Brook Lehigh.....	$3.00	$3.20	$2.60
Wilkes-Barre.....	2.85	3.20	2.60
Plymouth Red Ash.....	2.85	3.30	2.60

The prices of Wilkes-Barre coal, as quoted above, are lower than the circular quotations for seven months of 1877.

Some producers and dealers report a very good trade, but the public is awaiting the *announcement* of a rupture, when it looks for still lower prices. It is very evident, however, that the producers realize that the dissolution of the coal combination is as complete as it can be, and, so far as we can see, the parties in interest are farther from an understanding than at any previous time. We can see no grounds for even the hopes of some, that some arrangement can be arrived at, except in their expression that "it is necessary to the salvation of the trade." There is, upon this point, a wide difference of opinion, and the experience of the whole trade with combinations has certainly not supported this belief. A year ago the managers of some of the companies were outspoken in their disbelief in efforts to control the trade by artificial influences, predicting that if a combination were formed, the results would be just such as we have seen this year, but yet they afterward became strong supporters of the combination. It does not appear probabable that the same men, with the knowledge that they were right a year ago when they expressed themselves as opposed to combination should again join another for 1879; but this is a mere question of consistency which sits lightly on such eminent philosophers.

The production of anthracite coal last week was 336,743 tons, as against 293,419 tons the previous week, and 473,562 tons the corresponding week of 1877. The total production from January 1st to December 14th was 16,486,088 tons, as compared with 19,296,441 tons for the like period of last year, showing a falling off this year of 2,808,353 tons.

Bituminous.

This coal is without a feature worthy of note. There is a small business doing outside of the completion of contracts made in the spring. The outlook for very low prices in anthracite coal during 1879 is very discouraging to the producers of bituminous, and it will require the most strenuous efforts on their part to maintain the trade secured this year. The production this year has reached a very satisfactory figure, when it is considered how depressed general manufacturing has been, and how much coal the trans-Atlantic steamships have purchased abroad. The Cumberland production on the 14th inst. showed an increase of 109,625 tons over that to the same date in 1877, while the Clearfield Region showed a loss of but 75,581 tons to Dec. 14th.

New York.

Wholesale Prices of Anthracite Coal Delivery f. o. b. at Tide Water Shipping Ports, per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
‡Lackawana, at Weehawken	.....	.....	.....	.....	.....	.....
*Pittston, at Newburg.....	.....	2 60	2 60	2 60	3 05	2 60
L. Val. Coal Co., at Amboy	.....	.....	.....	.....	.....	.....
Wilkes-Barre at Pt. Johnson	2 60	2 60	2 70	2 85	3 20	2 60
Plymouth Red Ash at Port Johnson.....	.....	.....	2 70	2 85	3 30	2 60
Swoyers at Eliz. Pt. or S. A.	2 60	2 60	2 60	2 75	3 20	2 60
LEHIGH COAL.						
‡L. V. Coal Co., at P. Amboy.	.....	.....	.....	.....	.....	.....
Cross Creek, at Port John.	3 00	3 00	3 00	3 00	3 20	2 60
Buck Mount. Vein at Elizabeth Port or S. A.....	3 50	3 00	3 00	3 00	3 20	2 60
Hazleton at Amboy	4 00	.....	3 75	.....	3 90	3 40
Mount Pleasant at Hoboken	3 75	.....	3 25	3 25	3 25	2 75
Hazleton at Hoboken.....	3 75	.....	3 25	3 25	3 25	2 75
SCHUYLKILL COAL‡						
At Pt. Richmond, Phila.						
Hard White Ash.	3 50	3 50	3 50	3 55	3 95	3 40
Free-burning W. Ash. . .,	.....	.....	3 40	3 50	3 95	3 30
Schuylkill Red Ash.....	.....	.....	.....	3 75	4 00	3 30
Lorberry.....	.....	.....	3 80	3 95	4 00	3 40
Lykens Valley Vein.....	.....	.....	3 80	3 95	4 00	3 60
†*Alongside in N.Y. Harbor.*						
Hard White Ash	4 20	4 20	4 20	4 20	4 40	3 80
Free-burning W. Ash.....	.....	.....	3 90	4 05	4 40	3 80
Schuylkill Red Ash.....	.....	.....	.....	4 35	4 50	3 90
Lorberry.....	.....	.....	.....	4 60	4 60	4 25
Lykens Valley Vein.....	.....	.....	4 60	4 70	4 70	4 35

* Forty cents per ton additional for delivery in New York.

† On coal delivered f. o. b. at the Philadelphia and Reading Coal and Iron Co.'s Wharf at Williamsburg, the current rate of harbor freight will be allowed from the prices here given.

‡ Quotations nominal.

Wholesale Prices of Bituminous Coal.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
DOMESTIC GAS COALS.		
Westmoreland and Penn.....	$4.25	.....
At Greenwich, Philadelphia	.....	$5.50
At S. Amboy.	5.00	5 50
Kanawha at Richmond	4.10	5.40
Red Bank Cannel, Pa., at Philadelphia..	8.00	8.50
Youghiogheny, Waverly Co., at Balt	4.00	5.65
Despard, West Va.....	4.50	6.00
Murphy Run, West Va., at Baltimore. ..	3.75	5.85
Fairmount, West Va., " " ...	3 75	5.70
Newburg Orrel, Md. " " ...	3.75	6.00
Cannelton Cannel, West Va	....	10.00
" Splint " at Richmond.	6.00	7.00
" Gas Coal at Richmond	4.00	5.65
Peytona Cannel, W. Va., at Richmond...	....	10.00
MANUFACTURING AND STEAM COALS.		
Cumberland at Georgetown and Alexandria	2.75@2.90	4.35@4.50
Cumberland, at Baltimore.....	2.90@3.00	4.35@4.50
Cl'rfi'd "Eureka" and "Franklin."		
At mines.....	0.75	....
At Baltimore.....	3.25	4.50
At Philadelphia.....	3.25	4.50

	Sterling.	Am. cur'ncy
FOREIGN GAS COALS.		
Newcastle, at Newcastle-on-Tyne.....	7s.6d.	$2 50@ $3.50
Liv. House Orrel, at Liv.....	25s.	13.00
Ince Hall Cannel " ....,	35s.6d.	18.00
" Gas Cannel "	25s.6d.	10 00@ 10.50
Scotch Gas Cannel, at Glasgow, nominal.....	25s.	7 50
	Gold.	
Bl'k House, at Cow Bay, N.S.	$1.75	$4.50
Caledonia. at Pt. Caledonia.	1.50	4.25
Glace Bay at Glace Bay....	1.50	4.00
Lingan, at Lingan Bay.....	1.50	....
Intern'l Mines, at Sydney...	1.75	4.50
Pictou, Vale Mines, at Pictou	2.00	4.70

Retail Prices.

Per ton of 2000 lbs,

Anthracite.

	G. & Egg.	Stove.	Chest.
Pittston coal delivered	$5.00	$5.00	$5.00
Lack. coal, delivered below 59th St.	4.50	4.75	4.50

Bituminous.

Liv. House Orrel	$18.00	American Orrel	$11.00
Liv. House Cannel	18.00	Red Bank Cannel	7.00
Am. "	11.00	Cumberland	9.00
Ca'n'lt'n Bl'k, or splint.	10.00		

Baltimore. Dec. 17, 1878.

[Specially reported.]

Wholesale Prices per ton of 2240 lbs.

In cars at Depot N. C. R. R.

HARD WHITE ASH, FREE-BURNING WHITE ASH, SHAMOKIN, ETC.

Lump and Steamboat	$4.05	Stove	$4.50
Broken	4.20	Chestnut	4.05
Egg	4.30		

LYKENS VALLEY RED ASH.

Broken	$4.40	Stove	$4.70
Egg	4.55	Chestnut	4.15

By cargo afloat, 15c. *less* per ton than car prices. To trade from wharf or yard, 50c. per ton *above* car prices.

Buffalo. Dec. 17, 1878.

[Specially reported by E. L. HEDSTROM.]

	Lump.	Grate.	Egg.	Stove.	Nut.
Scranton	....	$4.55	$4.65	$4.90	$4.40
Wyoming	....	4.55	4.65	4.90	4.40
Lehigh (Sugar Loaf)	....	....	....	....	....

Blossburg, $3.50, F. O. B.

Hamilton, Ont. Dec. 17, 1878.

[Specially reported by H BARNARD.]

Retail prices delivered per ton of 2000 lbs.

cr. or Wilkes-B. Grate.	$4.75	Lehigh Lump	$6.00
" " Egg	4.75	Brier Hill	5.00
" " Stove.	5.25	Massillon	4.50
" " Nut	4.75	Smithing	5.50

From wharf or yard to the trade, 50c. per ton additional. Afloat by cargo per canal barge, 15c. per ton less than in cars at depot.

Indianapolis. Dec. 17, 1878.

[Specially reported by Messrs. COBB & BRANHAM.]

WHOLESALE BITUMINOUS.

On board cars, per ton of 200 lbs.

White River	None in market	Hocking Valley	4.20
Brazil Block	$2.10	Raymond City	3.40
Highland Grate	1.85	Youghiogheny	3.70
Indiana Cannel	3.65	Blossburg (smithing)	5.25
Peytona	5.70	Piedmont "	5.25

Per car, 12 tons.

Block coal, nut	$15.00	Block Slack	$12.00
Highland, "	14.00		

RETAIL BITUMINOUS.

Delivered per bushel of 70 lbs.

Raymond City	14c.	Block Nut, steam use	6c.
Brazil Block	10	" Slack, "	5
Highland Grate	9	Virginia Cannel	24
Block Nut, domestic use	10	Indiana Cannel	15
Highland Nut, " "	11	Youghiogheny	15
" " steam	8	Blossburg	24

GAS COKE.

Per bushel, measure containing 2888 cubic inches.

Retail, crushed	8c.	Wholesale, lump	6½c.
" lump	7	" crushed	7½

ANTHRACITE.

Per ton of 2000 lbs.

Wholesale on Cars.		*Retail delivered.*	
Wilkes-Barre, all sizes	$5.50	Wilkes-Barre, all sizes	$6.50
Lackawanna, "	5.75	Lackawanna, "	6.50
Lehigh "	6.75	Lehigh, "	7.50

Louisville. Dec. 17, 1878.

[Specially reported by Messrs. BYRNE & SPEED.]

The demand at present is very good, in the city and on railroads.

Wholesale per bushel of 72 lbs.

Pittsburg	6c.	Kentucky, in river	5½c.
Raymond City	6	Kentucky, on cars	6

Retail.

Pittsburg	10c.	City made Coke	7c.
Raymond City	9	Gas Coke	8c.
Kentucky	8	Cannel Coal	17
Hard and soft Coke	8	Anthracite, per ton	$7.00

Milwaukee. Dec. 17, 1878.

Specially reported by Messrs. R. P. ELMORE & Co.]

Retail price per ton of 2000 lbs.

Lehigh prepared, chippings	@$7.00
" " lump	@ 7.50
Lackawanna prepared (all sizes)	@ 6.50
Briar Hill	@ 5.50
Steam cokes	$3.75@ 4.75

Montreal. Dec. 17, 1878.

[Specially reported by Messrs. ROBERT C. ADAMS & Co.]

Wholesale per 2240 lbs.

Scotch Steam	$4.50	Cape Breton Steam	$4.00
Pictou	4.25	Newcastle Smith's	5.00

Anthracite at retail, per 2000 lbs. delivered.

Stove	$6.50	Chestnut	$6.00
Egg	6.25		

New Orleans. Dec. 17, 1878.

[Specially reported by Messrs. C. A. MILTENBERGER & Co.

PITTSBURG COAL.

At wholesale (by boat-load)	27@30c.	per bbl. of 180 lbs.	
To steamboats	45c.	"	"
" manufactories	45c.	"	"
" families	50c.	"	"

In hhds. (for shipment), $5.00 per hhd from 5 to 6 bbls.

ANTHRACITE COAL

Per ton of 2000 lbs.

At wholesale	$6.00 to $7.00
To families etc.	8 50 to 9.00

ST. BERNARD (KY.) COAL.

To steamboats	40c.	per bbl. of 180 lbs.	
" families	45c.	"	"
Virginia cannel at retail	85c.	"	"

Philadelphia. Dec. 19, 1878.

The decline at the auction sale, which has been met by all the companies for prices on board with a promptness and unanimity truly heroic, has prostrated the trade still more, if possible. No change in tolls taking place, individual operators are mere spectators, and anxiously waiting for the result of the next meeting of the Board of Control. Some of the collieries which were drowned out last week, are now working, but with the exception of the coal and iron colliery and a few red-ash collieries, very little coal is produced, and that little used to fill the gaps in the retail yards.

Captains decline, as a general thing, the rates offered, which rule, from $1.25 upward, to Boston.

Pittston, Pa. Dec. 17, 1878.

Pennsylvania Coal Company's Coal in Yard.

Retail per ton of 2,000 lb.

Lump, Egg, and Stove	$2.25
Chestnut	2.00
Pea	1.00

Delivered, 50 cents per ton additional.

Richmond. Dec. 17, 1878.

[Specially reported by S. H. HAWES, Dealer in Coal.]

Per ton of 2240 lbs. f.o.b.

Kanawha Cannel	$9.00	New River Bituminous	$3.30
Coalburg Splint	4.50	Clover Hill Coal	2.50
Lewiston "	4.50	Norwood Gas and	
Kanawha Gas Coal	4.10	Steam Coal	2.70

Sandusky. Dec. 17, 1878.

[Specially reported by Messrs. BLACK & CLARKE, Agents Con, Coal and Mining Company.]

Per ton of 2000 lbs.

ANTHRACITE.

	Grate.	Egg.	Stove.	Chest.
Lehigh	$6 00	$6.00	$6.25	$5.75
Wilkes-Barre	4.80	4.90	5.15	4.65
Pittston	4.80	4.90	5.15	4.65

BITUMINOUS.

Massillon	$2.85	Straitsville	$2.00
Hocking Valley	2.50	Piedmont	1.54

Prices retailed delivered 50c.@75c. above car prices.

San Francisco. Dec. 12, 1878.

COAL.—Imports from January 1st to December 1st, 1878:

	Tons.		Tons.
Anthracite	23,564	English	43,058
Australian	128,150	Mt. Diablo	89,320
Coos Bay	29,718	Rocky Mountain	371
Cumberland	8,044	Ione	665
Bellingham Bay	3,750	Carbondale	3,125
Vancouver Island	119,185	Ounalaska	450
Seattle	104,430	Carmen Island	109

The market is strong for all descriptions of foreign, as well as for North Pacific supplies. Anthracite is in large stock and very slow of sale at low prices. The consumption of Lehigh, Egg, etc., is very small, as compared with years past. We have now to note the purchase of the Sea King's cargo of 2004 tons Cumberland by a leading house in the trade, upon terms reserved, said to be at an extremely low price. The particulars of the sale are, however, withheld. The receipts during the week embrace the following: 500 tons from New York, per St. John Smith; 189 tons per Helicon, from same; Robert Dixon, from Nanaimo, 1840 tons; Arcata, 350 tons, Coos Bay; Conqueror, from Glasgow, 947 tons Scotch; 143 tons coke, per Dunnerdale, from Liverpool; Governor Tilley, from Departure Bay, with 2220 tons; Mountain Laurel, from Brisbane, with 640 tons. The Aureola, from Seattle, brought about 1300 tons. Frederick Stang, from Departure Bay, had 1550 tons Wellington. From Coos Bay we have the Emma, with 375 tons; Parallel, 235 tons; Ida Schnauer, 325 tons; and from Seattle, the Reporter, with 325 tons. The Hera brings 516 tons Wellington, which we quote at $19 for screened.—*Commercial Herald.*

St. Louis. Dec. 17, 1878.

Reported by JAMES J. SYLVESTER, Secretary of the Anthracite Coal Association.]

Retail prices, delivered. Ton of 2000 lbs.

ANTHRACITE.

	Per ton.		Per ton.
Lackawanna	$7.50@	Lehigh	$8.50@
Wilkes-Barre	7.50@	Connells. Coke.	6.00@
Schuylkill	7.50@	Blossburg	7.75@

Dec. 17, 1878.

[Specially reported by Messrs. LEWIS P. HARVEY & Co.]

BITUMINOUS.

Big Muddy	$3.65	Piedmont	$7.25
Indiana Block.	3.25	Pittsburg	4.35
Illinois Coals	2.25@2.50	Peytona	7.50
Blossburg	7.75	Lehigh Vel. Ant.	7.50@8.00

Toledo. Dec. 17, 1878.

[Specially reported by Messrs. GOSLINE & BARBOUR.]

We quote the following as the present prices for coal, f. o. b. on cars here, per ton of 2000 lbs.:

Ton of 2000 lbs.

	Grate.	Egg.	Stove.	Chest.
Pittston	$5.05	$5.15	$5.40	$4.90
Wilkes-Barre	5.05	5.15	5.40	4.90
Lackawanna	5.05	5.15	5.40	4.90

Lehigh lump, $6.00.

Ton of 2000 lbs.

Straitsville lump	$2.60	Massillon nut	$2.40
" nut	2.25	Willow Bank lump	2.85
Shawnee lump	2.60	" nut	2.40
" nut	2.25	Cumberland	5.00
Hocking Valley lump	2.60	Blossburg	4.60
" nut	2.25	Morris Run	4.60
Massillon lump	2.85	Gas Coal	3.25

Retail prices, delivered in the city, are: Stove. $6.00; Grate. Egg, and Chestnut, $5.75.

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to Dec. 19th, 1878.

PORTS.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Alexandria	97½@1.00		
Albany			
Allyn's Point	1.25		75
Annapolis	60		
Augusta			
Baltimore	45		
Bangor, Me			1.50
Barnstable			
Bath, Me			
Boston, Mass	1.50@.175	1.75	1.25
Braintree			
Bridgeport, Conn.		1.45	65
Bristol, R. I.			75
Brooklyn			
Cambridge, Mass.			1.50
Charleston	1.12½		
Chelsea			
Charlestown	1.80		1.50
Cambridgeport	2.00		1.50
Danversport	2.00†		1.75
East Cambridge	1.90		1.50
East Boston			1.25
Eliz'b'th City, N.C			
Fall River		1.50	90
Georgetown			
Gloucester	1.75		
Hackensack			
Halifax	1.50		1.50
Hartford		2.00	
Hingham			1.50†
Hoboken		1.10	
Hudson			
Jersey City		1.10	
Lynn	1.90		1.50†
Marblehead	1.75		
Middletown			
Newbern	85		
New Bedford	1.75		85
Newburyport		2.00	1.50
New Haven	1.15†	1.45	65
New London	1.35	1.45	70
Newport			75
New Rochelle	85		
New York	85@95	1.30	
Newark		1.40	
Norfolk, Va	70@75		
Norwich		1.50	80@90
Norwalk, Conn		1.40	
Pawtucket	1.50‡		1.00
Petersburg	1.00		
Philadelphia		60	
Port Eades			2.50
Port Royal			
Portland	1.55	1.80	1.50
Portsmouth, Va	67½		
Portsmouth, N.H.	2.20	1.85	1.50
Providence		1.50	80
Richmond, Va	90@95		
Saco			2.00
Sag Harbor			
Salem, Mass.		1.80	1.25
Savannah			
Saybrook			
Somerset			75
Southport			
St. John, N. B.			1.00‡
Trenton		1.25	
Troy			70
Wareham		1.60	
Washington	1.00		
Williamsburg	85		
W'lmington, Del.		60	
Yarmouth, N. S.	2.25		

* And discharging and towing. † And discharging. ‡ And towing. § 3 cents per bridge extra.

Alexandria and Georgetown to Boston, 1.85@2.00.

Perth Amboy to Boston, 1.25.

Ocean Freights.

Ocean Freights on coal, iron, etc., per ton of 2000 lbs. to and from foreign and domestic ports, for four weeks ending Dec. 17th, 1878, are given below.

DATE.	From	To	Cargo.	R'te
Nov. 22	Booth Bay	Savannah	*	1.75
" 22	Boston	Alexandria	Salt	8
" 22	Curaçoa	Boston	Salt	9
" 23	Boston	New York	Salt	3
" 25	Perth Amboy	Wilmingt'n, N.C	RR. iron	2.00
" 25	Dutchess Junction	Richmond	Pig-iron	1.25
" 25	New York	Georgeto'n, D.C	Guano	1.50
" 26	San Francisco	Departure Bay.	Coal	3.00
" 29	Perth Amboy	City Point	RR. iron	1.00
Dec. 3	New Haven	Philadelphia	Rails	1.50
" 3	Elizabethport	Richmond	Pig-iron	80
" 3	New York	Port Royal	*	1.75
" 6	New York	Bremen	Salt	25s.
" 6	Perth Amboy	Port Royal	RR. iron	1.85
" 6	New York	Richmond	Iron ore	1.00
" 7	Philadelphia	St. Thomas	Coal	2.65
" 7	Philadelphia	Havana		1.50
" 13	Woods' Hole	Pensacola	Guano	1.60
" 13	Baltimore	Acapulco	Coal	8.50
" 17	Boston	San Francisco	Iron	†

* Phosphate. † $10@$12.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 20, 1878.

American Pig.—The year is closing on a condi-

tion of great stagnation in demand and demoralization in prices. It is still evident that the necessities of some companies are such as to compel them to sell their iron at such prices as they can secure, with the hopes that something will turn up enabling them to tide over to better times. The most likely thing to turn up is, however, the failure of those companies that are selling their iron at less than cost, and after that has occurred, we may look for a slight advance to take place. For the next two weeks but very little business can be looked for, as there is no speculative demand, and regular consumers will not take more than is actually necessary during the time of stock-taking and closing their books. The Thomas Iron Company is holding its iron on the basis of $18 for No. 1 Foundry, and in so doing is only able to sell to those who feel that they must have this class of iron. The business in other brands is very quiet, and prices in some instances are very low. We quote No. 1 Foundry at $16@$18; No. 2 Foundry, $15@$17; and Forge at $14@$16.

Scotch Pig.—We are reported a sale of 100 tons of Eglinton at a low price. In addition to this, 150 tons of Coltness and Eglinton are reported as sold in lots. We quote Coltness at $22@$22.50, and Eglinton, $19.50@$20.

From the circular of Messrs. John E. Swan & Brothers, of Glasgow, bearing date of December 6th, we learn that the number of furnaces in blast was 92, as compared with 88 a year previous. The stock of pig-iron in Connal & Co.'s stores was 199,328 tons, as against 166,670 tons at same date in 1877. The shipments of pig-iron to November 30th, as compared with like period of 1877, showed a falling off of 53,690 tons, and the imports of Middlesbrough pig-iron in the same comparison, show a falling off of 12,340 tons. The price of warrants (⅗ No. 1 and ⅖ No. 3, g. m. b.) was 43s. 2d. The following were the quotations of the leading brands of No. 1 irons: Gartsherrie, 49s. 6d.; Coltness, 50s. 6d.; Summerlee, 48s.; Langloan, 52s.; Glengarnock, 47s.; Eglinton, 43s. 6d. Middlesbrough pig-iron was quoted as follows, f. o. b., Lees: No. 1, 39s. 6d.; No. 2, 37s. 6d.; No. 3, 36s.; No. 4, 35s. 6d.; No. 4 forge, 35s. 6d. The following were the quotations of Bessemer iron, f. o. b., Barrow: No. 1, 65s.; No. 2, 62s. 6d.; No. 3, 60s.

Rails.—A very large business has been done in steel rails for delivery next year. During the past week sales aggregating about 20,000 tons have been made. The prices obtained are in most instances kept secret, but for 3000 tons of the above, the prices received at tide-water were $42.25, $42.50, and $43 per ton. Prices, at all events, are not showing the strength they should with the business large that is indicated for next year. In iron rails we learn of no business. The quotations at mills are nominally $41 for steel and $32@$36 for iron.

Messrs. John H. Austin & Co., of London, under date of December 4th, quote nominally as follows f. o. b. English ports: Iron rails, 50 to 60 lbs. per yard, £4 12s. 6d. per ton; steel rails, same weights, £5 10s. per ton.

Old Rails.—It is said that a large block of old rails for next spring's delivery are offered lower than late quotations. In the absence of business we quote nominally for immediate delivery at $19.

Wrought Scrap.—There has been no business during the past week. We quote at $22.

Baltimore. Dec. 17, 1878.

[Specially reported by Messrs. R. C. HOFFMAN & Co.]

Balt. Char.	$26.00@$28.00	M. & White	$13.00@$14.00
Va. "	26.00@ 28.00	C'l C.B. Blooms	50.00@ 52.00
Anth. No. 1	19.00@ 20.00	" " Billetts	52.00@ 55.00
" " 2	18.00@ 19.00	Refi'd Blooms	43.00@ 45.00
" " 3	16.00@ 17.00		

Buffalo. Dec. 19, 1878.

[Specially reported by Messrs. PALEN & BURNS.]

Business quiet, as it usually is at the approach of the holidays. We quote to-day as follows for reliable brands pig-iron, delivered on cars here, gross tons:

	Cash.	4 mos.
No. 1 Ex. Foundry	$18.00	$18.50
No. 2 "	17.00	17.50
Mill	16.00	16.50
Charcoal iron (all numbers)	24.50	.....
Lake Superior ores	.....	.....
American Scotch A 1	.....	19.00
" " B 1	.....	17.00
" " No. 2	.....	16.50
" " No. 3	.....	.....
Best selected Connellsville coke, per net ton	.....	4.75

Chattanooga. Dec. 17, 1878.

[Specially reported by J. F. JAMES, Dealer in Iron & Metals.]

Tenn., Ala. & Ga. Charcoal, No. 1 Foundry	$16.00@$17.00
Tenn., Ala. & Ga. Charcoal, No. 2 Foundry	15.00@ 16.00
Tenn., Ala. & Ga. Charcoal, Gray Forge	13.00@ 15.00
Tenn., Ala. & Ga. Coke, No. 1 Foundry	18.00@ 19.00
Tenn., Ala. & Ga. Coke No 2 Foundry	16.00@ 17.00
Tenn., Ala. & Ga. Coke, Gray Forge	14.00@ 15.00
Charcoal or Coke, white and mottled	13.00@ .....
Old rails	$18 00@$19 00
Old car wh'ls.	16 00@ 17 00
Wr'ght scrap, No. 1	16 00
Wr'ght scrap, No. 2	$11.00
Cast scrap	10.00
Muck bar	30.00@ 32.00

IRON ORES.

Red hematite or fossiliferous f. o. c. at mines, about 55 per cent metallic iron	$1.25
Brown hematite about 55 per cent metallic iron	1.75

Cincinnati. Dec. 17, 1878.

[Specially reported by Messrs. TRABER & AUBERY, Commission Merchants for the sale of pig iron, blooms, ore, etc.]

Below please find closing quotations of our pig-iron market, viz.:

CHARCOAL.

H'n'g Rock	No. 1 Foundry & B 1	$21.00@$21.50—4 mos.
"	No. 2 "	20.00@ 21.00—4 mos.
"	Soft Silver Gray	19.00@ 18.00—4 mos.
"	Mill	19.00@ 18.00—4 mos.
Tennessee	No. 1 Foundry	20.00@ .....—4 mos.
"	No. 2 "	19.00@ .....—4 mos.
"	Mill	18.00@ .....—4 mos.

STONE COAL.

Ohio	No. 1 Foundry	$16.00@ 16.50—4 mos.
"	No. 2 "	15.00@ .....—4 mos.
"	No. 3 "	14.00@ .....—4 mos.
"	No. 4 "	13.00@ .....—4 mos.
"	Mill	15.00@ 16.00—4 mos.

COKE.

Ohio & W. Va.	No. 1 Foundry	18.50@ 19.00—4 mos.
" "	No. 2 "	17.50@ .....—4 mos.
" "	Stove	16.00@ .....—4 mos.
" "	Mill	17.00@ .....—4 mos.

CAR-WHEEL

H'n'g R., C. B	Hecla, Vesuvius, Etna, Buckhorn, Jefferson.	$30.00@ 35.00—4 mos.
Maryland, "	Cedar Point	35.00@ .....—4 mos
Missouri, "	Maramec	28.00@ ... .—4 mos

BLOOMS.

Charcoal	$45.00@$50.00—cash.

SCRAP IRON.

Cast	40c. @ 45c.—cash
Wrought	62½c.@ $1.00—cash

Cleveland. Dec. 17, 1878.

[Specially reported by Messrs. C. E. BINGHAM & Co.]

No. 1 Red Specular	$6.00	per ton	cash.
No. 2 " "	5.00	"	"
Red Hematite	4.25	"	"
Lake Champlain ore	5.25	"	"

FOUNDRY IRON.

No. 1 L. S. Charcoal	$22 00	Am. S., No. 1, Ch. Val.	$20.00
No. 2 " "	21 00	" " B—1, " "	18.00
No. 1 Anthracite	20 00	" " No. 2 " "	18.00
No. 2 "	19 00	No. 1, Massillon	19.00
No. 1 Bituminous	20 00	B—1, "	17.00
No. 2 "	18 00	No. 2, "	16.00

CAR-WHEEL AND MALLEABLE IRON.

No. 3, L. S. Charcoal	$23 00	Nos. 5 & 6, L. S. Char.	$23 00
No 4, " "	23 00		

BESSEMER IRON.

Nos. 1 & 2, L. S. Char	$23.00

FORGE IRON.

No. 1, Gray	$18 00	White and Mottled	$16 00

Columbus, O. Dec. 18, 1878.

[Specially reported by Messrs. KING, GILBERT & WARNER, Dealers in Pig Iron and Ores.]

The pig-iron market is in about the same condition as reported last week. The demand is moderate, and sales mostly in small lots. There seems to be a general feeling that prices on all grades of pig-iron will be better after the opening of the new year. Prices unchanged.

FOUNDRY IRONS

No. 1 Hanging Rock Charcoal	$22.00@$22.50
No. 2 " " "	21.00@ 21.50
No. 1 Hocking Valley soft and strong from pure limestone ores	18.25@ 18.75
No. 2 Hocking Valley soft and strong from pure limestone ores	17.25@ 17.75
No. 1 American Scotch	18.00@ 18.50
No. 1 Moxahala	18.00@ 18.50
No. 2 "	17.00@ 17.50
No. 1 Shawnee	18.00@ 18.50
No. 1 Silver Gray	16.50@ 17.00
No. 2 " "	15.50@ 16.50

MILL IRONS.

Gray neutral	16.00@ 16.50
Mottled and white neutral	15.00@ 15.50
Gray coid short	15.50@ 16.00
Mottled and white cold short	14.50@ 15.00

Louisville. Dec. 17, 1878.

[Specially reported by Messrs. GEORGE H. HULL & Co.]

The demand is better than last week. The general impression seems to be that prices will be better after January 1st, and some are buying in anticipation of this.

The usual time, four months, is allowed on quotations below:

FOUNDRY IRONS.

	No. 1.	No. 2.
Hanging Rock Charcoal	$21 00@$22.00	$19.00@$20.00
Southern Charcoal	18.00@ 18.50	16.50@ 17.00
H'n'g Rock, Stc'l & Coke	19.00@ 20.00	18.00@ 18.50
Southern Stonecoal & Coke	18.50@ 19.00	17.00@ 17.50

"Amer. Scotch"... $18@$19 | Silver Gray... $16@$17.00

MILL IRONS.

No. 1 Charcoal, Cold-short & Neutral	$16.50@$17.00
No. 1 Stc'l & Coke, Cold-short & Neutral	16.50@ 17.00
No. 2 Stc'l & Coke, Cold-short & Neutral	15.50@ 16.00
No. 1 Missouri and Indiana, Red-short	20.00@ 21.00
White & Mottled, Cold-short & Neutral	14.50@ 15.00

CAR-WHEEL AND MALLEABLE IRONS.

Hanging Rock, Cold Blast	$29.00@$33.00
Alabama and Georgia, Cold Blast	28.00@ 29.00
Kentucky, Cold Blast	25.00@ 30.00

Milwaukee. Dec. 17, 1878.

[Specially reported by Messrs. R. P. ELMORE & Co.]

CHARCOAL IRON.

No. 1 Lake Superior per gross ton	$23.00—4 mos.
" 2 " " " "	22.00—4 mos.

ANTHRACITE IRON.

No. 1 Anthracite per gross ton	23.00—4 mos.
" 2 " " "	22.00—4 mos.

STONE COAL AND COKE.

Warner's Am Sc'th (Bk. Band, per ton	$24.00@ ....—4 mos.
Soft Silvery per ton	21.00@ ....—4 mos.
Ohio Stone Coal	22.00@ ....—4 mos.

CAR WHEEL.

Lake Superior ores per ton	$24.00@25.00—4 mos

Philadelphia. Dec. 19, 1878.

[Specially reported by JUSTICE COX, JR., & Co., Iron Merchants, 333 Walnut street, Philadelphia.]

Pig Iron.—There is little business to report this week. Some few orders are being placed for next year's delivery, but most consumers are preparing for stock taking, and thinking more of their balance sheets than of materials for next year's work. We report sales of about 1000 tons, in lots, and quote No. 1 at $17@$19; No. 2 at $16@$18; Gray Forge, $15@$17; all Philadelphia delivery.

Manufactured Iron.—The demand for bars is unusually good for the time of year and inquiries are numerous, as many think after the first of the year better prices will rule. As mills find the year's business has left them no profits, they will at least hold firm to present prices if not try for an advance. In plates some few orders are pressing on the market, but generally mills are clearing up back orders and hoping for better times. There is more demand for skelp, but prices rule so low that some mills making this class of iron, decline to bid. We hear of an order taken this week at low prices, but one or two mills bidding for the contract. We quote: Bars, 1 7-10@2c., Plate and Tank, 2⅛@6c., as to quality; Skelp, 1 9-10@2c per lb.

Rails.—The market for steel rails is reported not so firm as for the last few months. Yet the mills have all they can do for the present, with orders in prospect for months to come. In iron rails most mills have had all they could do in light section, and will be busy until the first of the year. We quote: Steel, $42@$44; Iron, $32@$36, all at mill.

Old Rails.—There is nothing new to report. Market firm at $18½@$20.

Scrap.—Wrought is dull of sale at $19@$22; Cast, $12@$16.

Pittsburg. Dec. 17, 1878.

[Specially reported by A. H. CHILDS.]

	4 mos.		4 mos.
No. 1 F'dry	$19.00@$20.00	M. & White	$15.00@$16.00
No. 2 "	18.00@ 19.00	Hot Blast Ch.	20.00@ 23.00
Gray Forge	16.50@ 19.00	Cold Blast W.	35.00@ 37.00

Richmond, Va. Dec. 17, 1878.

[Specially reported by ASA SNYDER, Esq.]

Amer. Scotch Pig Iron			$21.50@$22.50
Anthracite "	"	No. 1	19.00@ 20.00
" "	"	No. 2	18.50@ 19.00
" "	"	No. 3	17.00@ 18.00
" "		Mottled	15.00@ 16.00
Coke "		No. 1	19.00@ 20.00
" "		No. 2	18.00@ 19.00
Va. Cold Blast Charcoal Pig Iron, cold short			19.00@ 22.00
" " " " "		neutral	27.00@ 28.00
" Warm " " "		cold short	18.00@ 20.00
" " " " "		mill	17 00@ 18 00
Old Rails			17.00@ 18.00
Wrought scrap No. 1			16.00@ 17.00
Cast scrap—Machinery			15.00@ 16.00
Richmond Refined Bar Iron			2.00@ 2.10
Horse-shoes			4.00@ .....
Mule-shoes			5.00@ . ..
Old Dominion nails (standard size)			2.25 keg.

Freight by sail to New York, $1.60 for 2240 lbs.

St. Louis. Dec. 17, 1878.

[Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.]

COLD BLAST CHARCOAL—ALL NUMBERS.

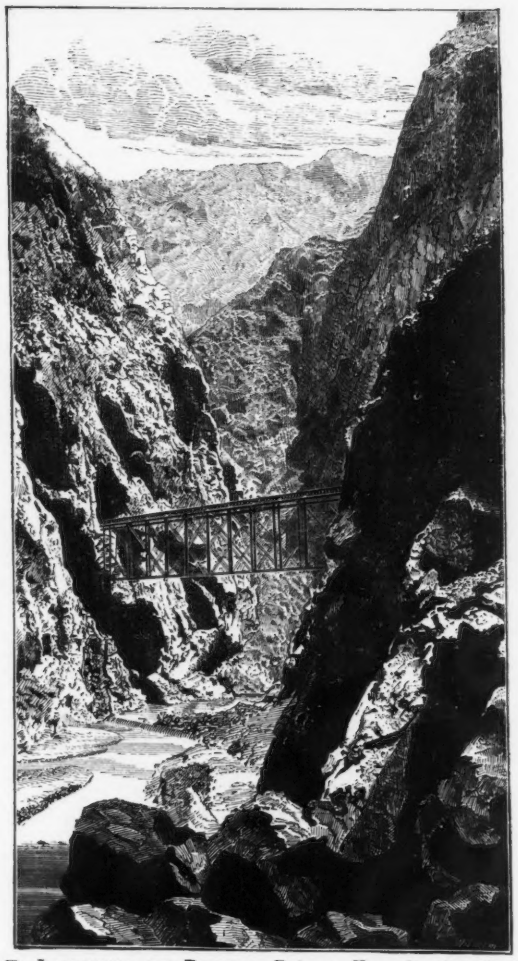
Hanging Rock	$23@$25	Assorted Bar Iron	$1.95	rates.	
Tennessee	22@ 23	No. 1 Wr'ght Scrap,	90c.	cwt.	
Kentucky	22@ 23	Heavy cast	"	65c.	"
Missouri	22@ 23	Light	"	"	40c. "
Georgia	22@ 23	Old rails	$19.00@	$21.00	
Alabama	22@ 23	Old carwheels	17.00@	18.00	

	No. 1.	No. 2.	Mill.	White and Mottl'd
Missouri stone coal	$21.00	$20.00	$19.00	$17.00
" charcoal	20.00	19.00	18.00	.....
Tennessee charcoal	20.00	18.50	17.50	.....
Tenn. coke very soft and strong	20.00	19.00	17.00	16.00
Hanging Rock charcoal	22.00	30.00	19.00	.....
" " cold short	23.00	21.00	20.00	.....
	ExNo.1	No. 1.	BNo.1.	No. 2.
Alice Hanging Rock coke.	$22.00	$21.00	$19.50	$19.00
Moxahala Black Band ores	21.00	20.00	19.50	18.00

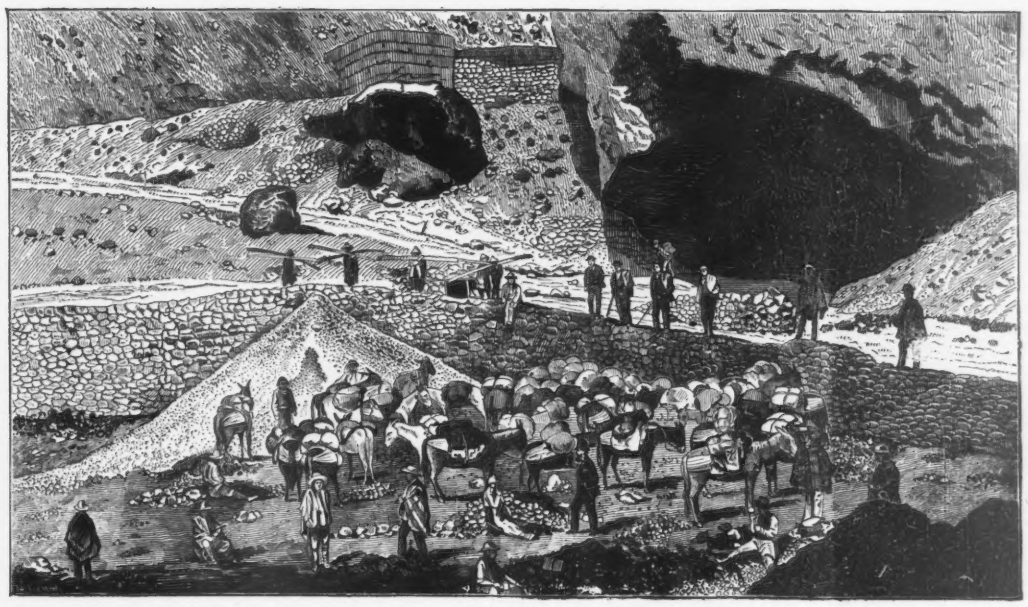
METALS

NEW YORK, Friday Evening, Dec. 20, 1878.

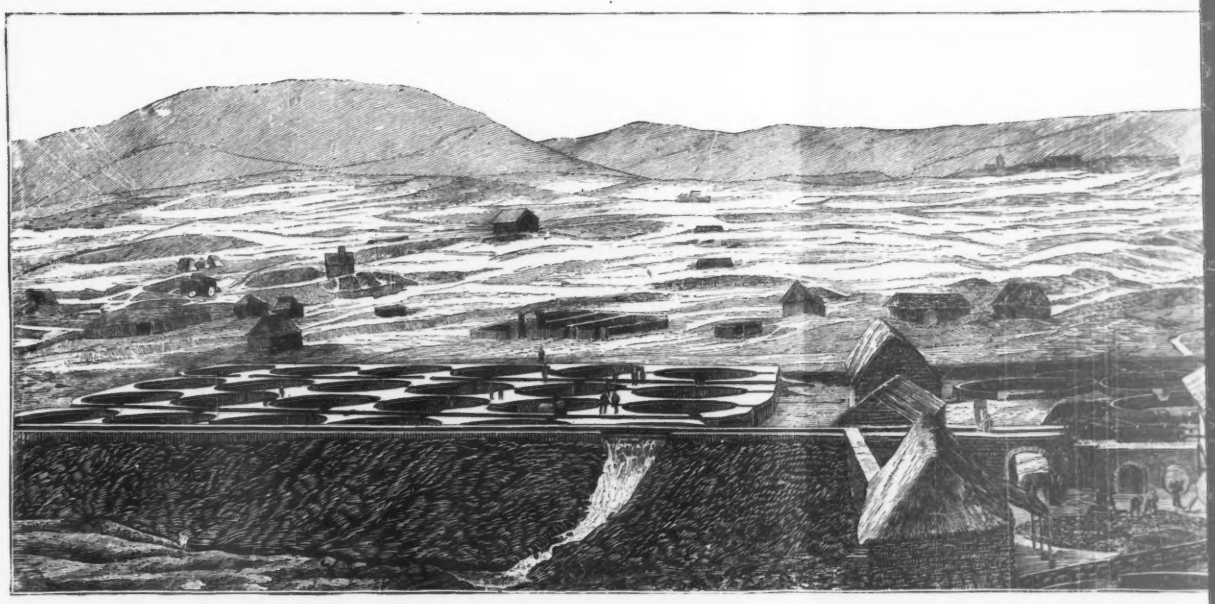
As we predicted (several weeks ago) would be the case, the closing of the year is very dull in the metal market. The consumption of metals in the United States has been quite large, and the apparent quietness at times during the year was owing to the fact that prices almost constantly had a downward inclination, and consumers were only supplying their pressing necessities. The outlook in England, the great metal market, is certainly not an encouraging feature for next year's business. With the large stocks of all classes of metals that are held in that



El Infernillo and Bridge.—Between Tunnels 31 and 32.

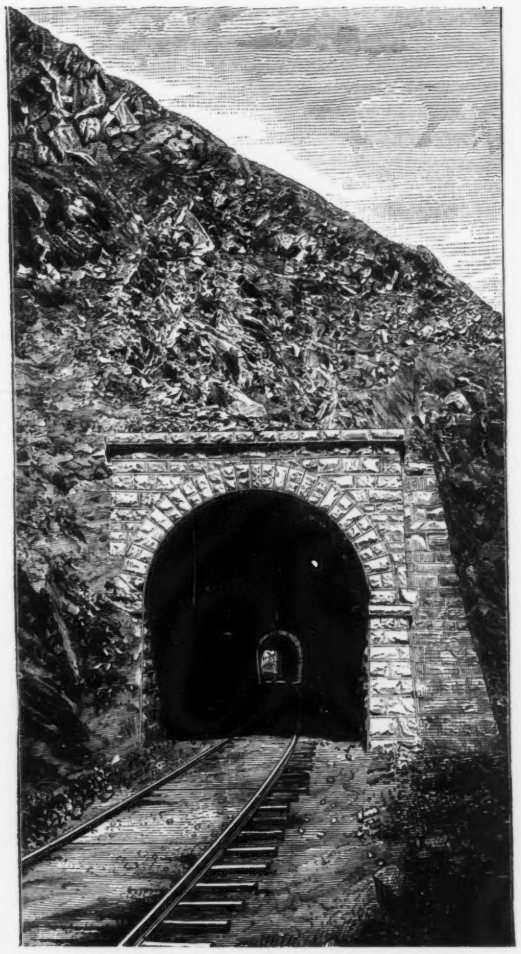


Loading Ores at Mines for Transportation to Mills.



Amalgamating Patios.

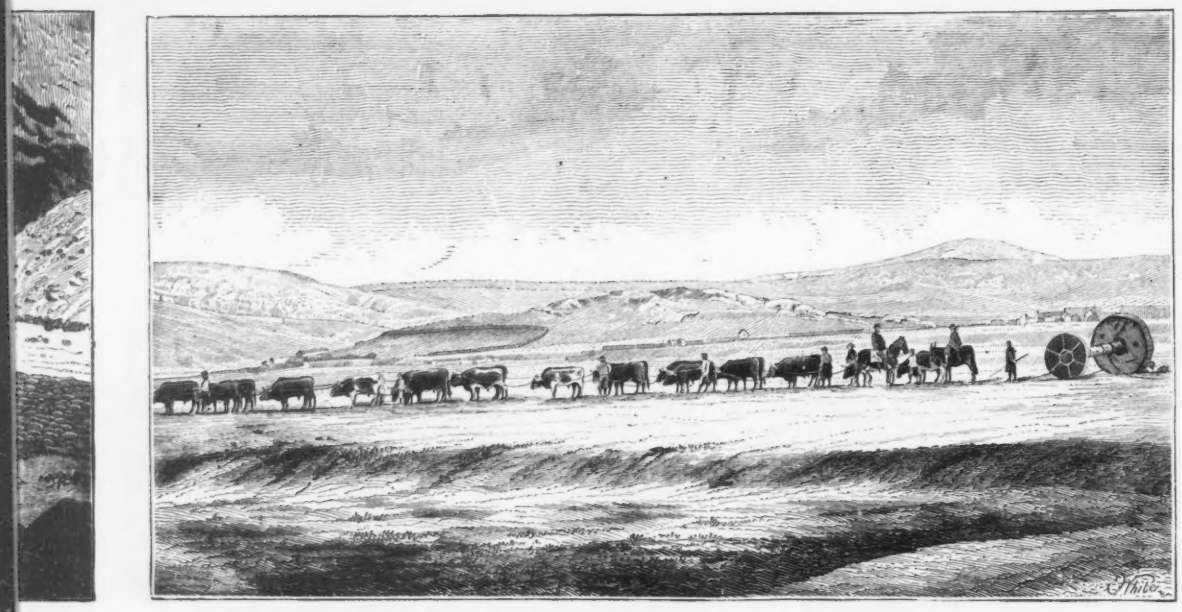
Mill Houses.
Hacienda de San Juan.



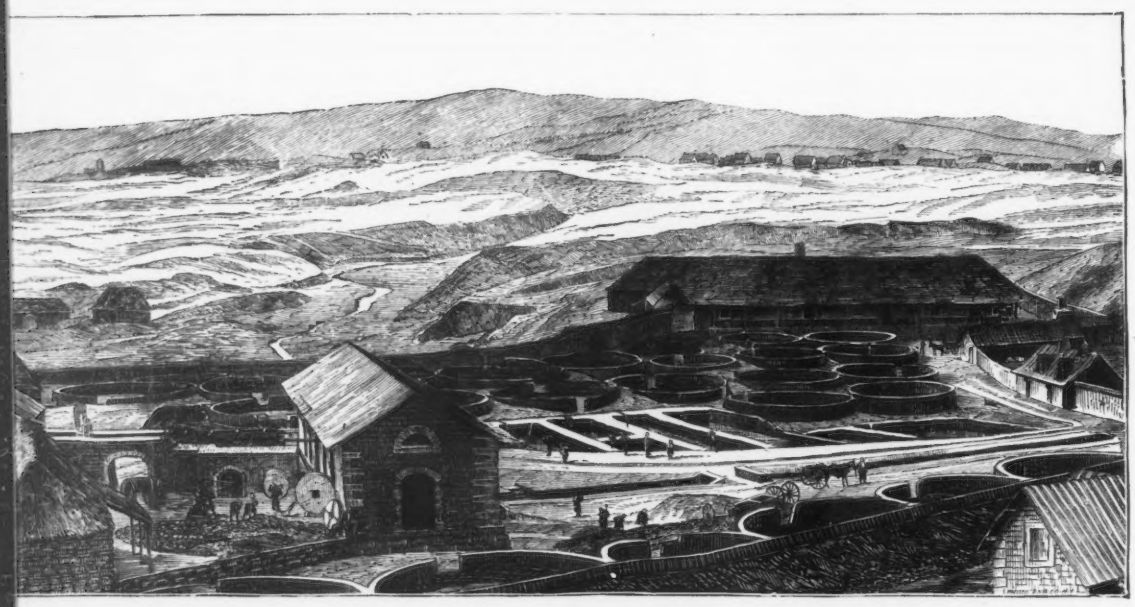
Tunnel Entrance.—Showing Construction.

Cerro de Pasco.

SCENERY ON THE CALLAO, LIMA, AND OROYA RAILWAY, AND VIEWS O



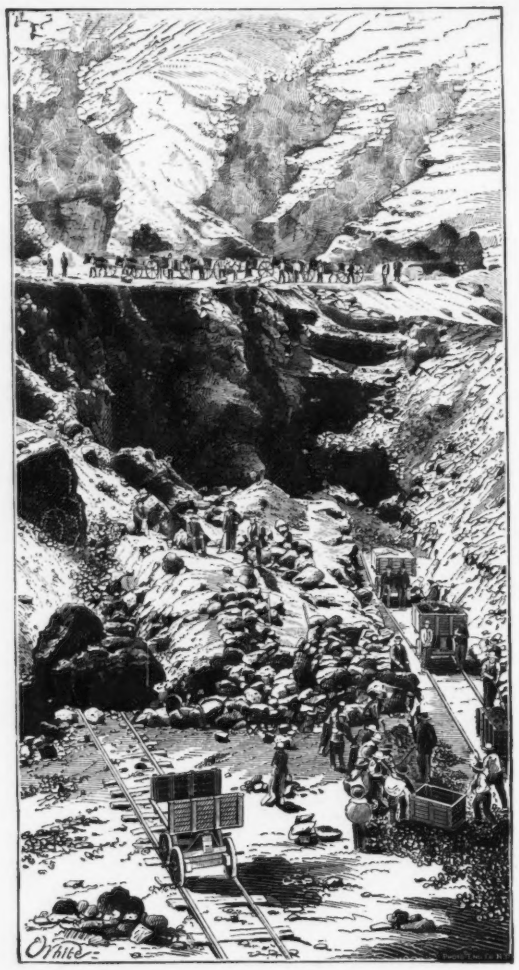
SCENE NEAR CERRO DE PASCO.—Conveying the Stone for Pulverizing Ores.



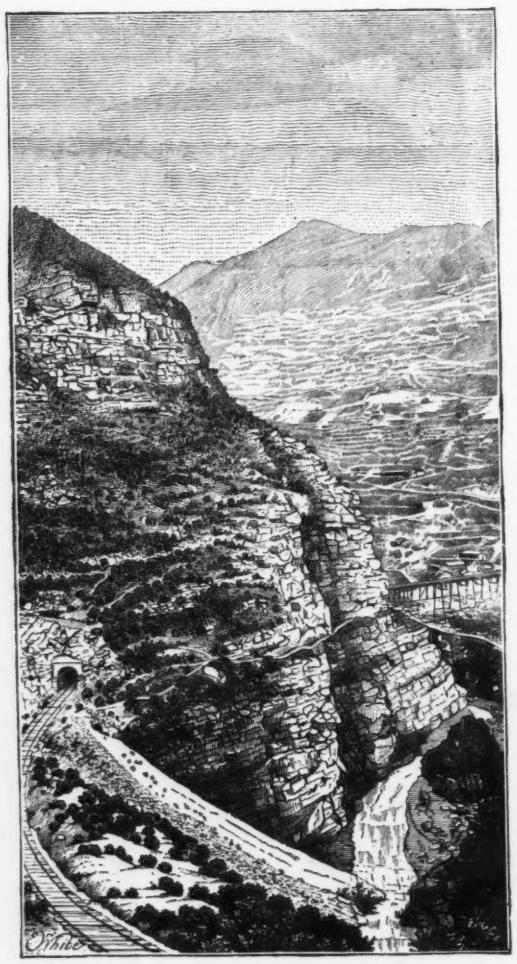
Mill Houses.
HACIENDA DE SAN JUAN.

Amalgamating Patios.

PERUVIAN ORE-DRESSERS.—Breaking Ore Preparatory to Pulverizing.

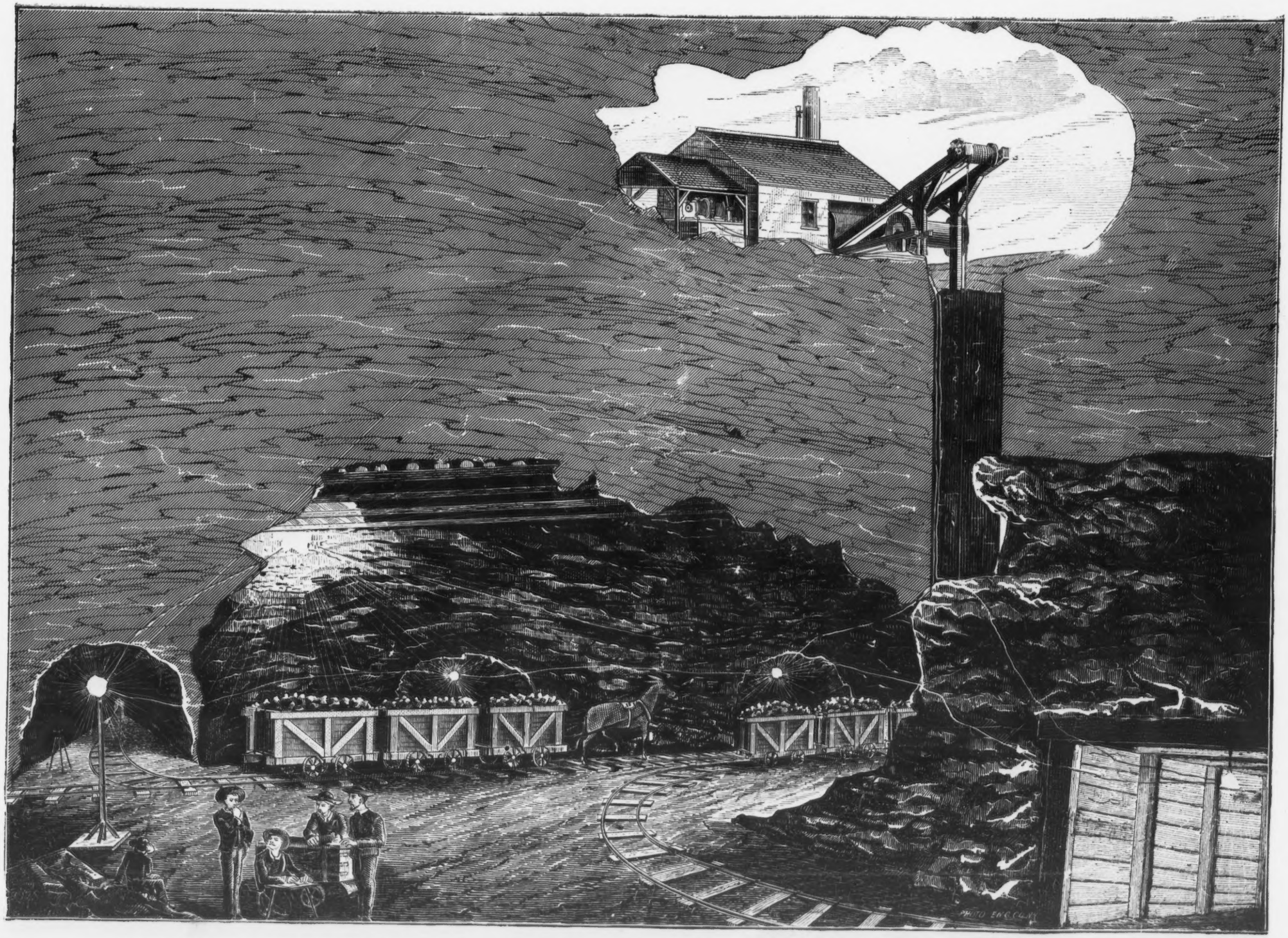


MINING IN OPEN CUT.—Working Two Benches.

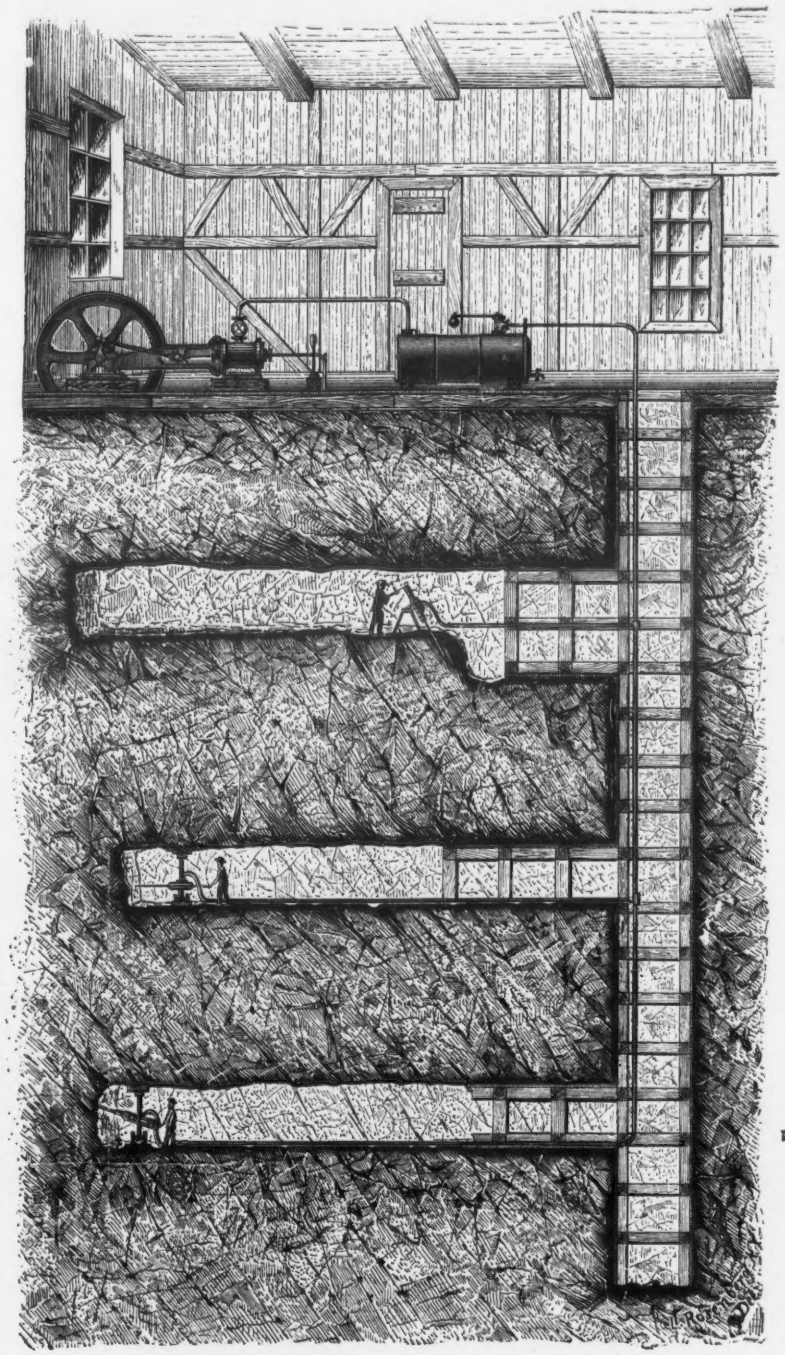


ANCHI VIADUCT.—Rio Rimac. Tunnel 35.

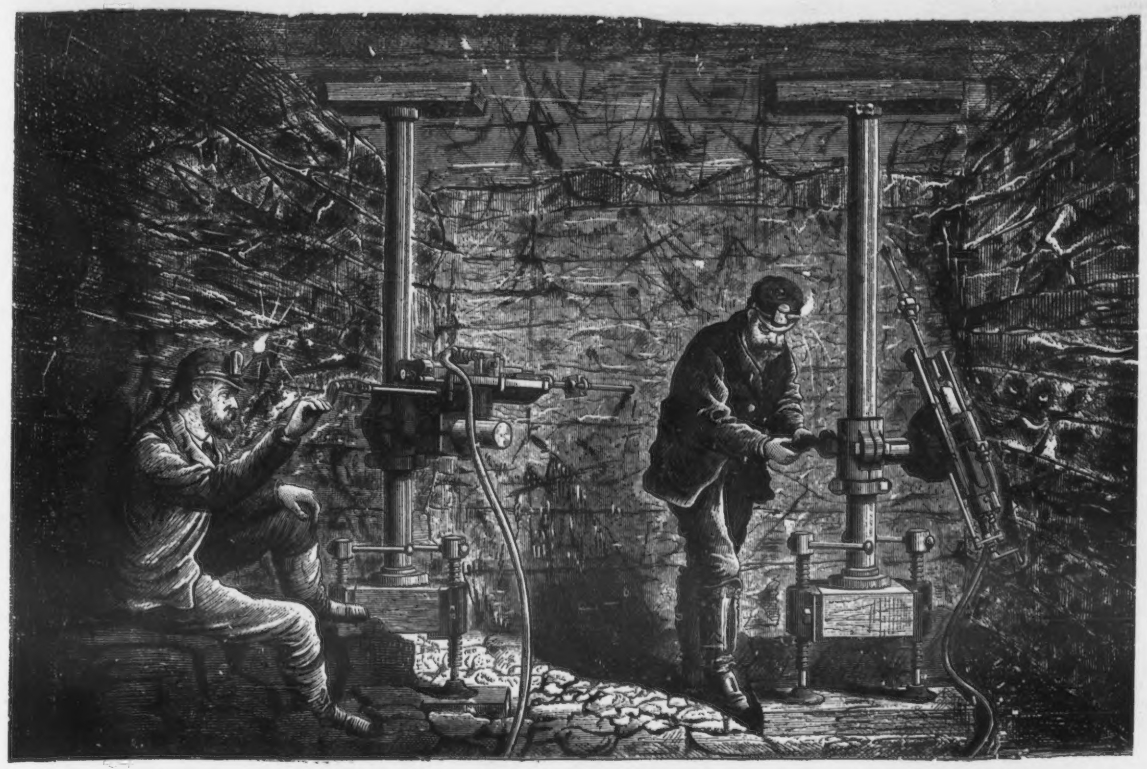
AY, AND VIEWS OF THE CERRO DE PASCO MINES. (SUPPLEMENT NO. 2.)



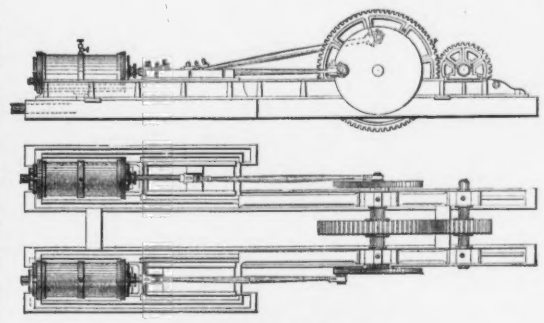
THE BRUSH ELECTRIC LIGHT AS APPLIED TO THE ILLUMINATION OF MINES. (SUPPLEMENT NO. 10.)



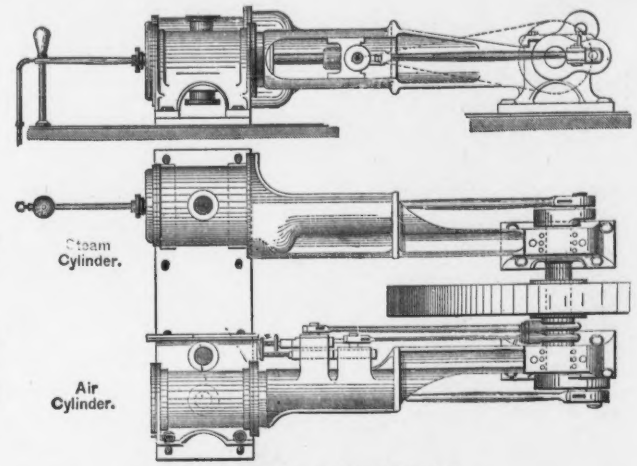
GENERAL ARRANGEMENT OF COMPRESSOR
in the Nevada Silver Mines.



RAND'S LITTLE GIANT ROCK DRILLS,
Mounted on the new "Calumet" Column, working on the new excavations in the East River, by the U. S. Government, under the charge of General Newton.



RAND AIR COMPRESSORS.
To be driven by Turbine Wheels.



HORIZONTAL COMPRESSOR.
Cut-Off Valve, Cranks arranged so that the effort and resistance are equalized.

RAND'S ROCK DRILLS AND AIR COMPRESSORS. (SUPPLEMENT NO. 9.)

country it is not at all improbable that some holders will be compelled to sacrifice their holdings, and the effect of lower prices must be felt here.

RECEIPTS OF METALS AT NEW YORK FOR THE FOUR WEEKS ENDING DECEMBER 19TH AND YEAR FROM JANUARY 1ST, 1878.

	Nov. 28.	Dec. 5.	Dec. 12.	Dec. 19.	Year from Jan. 1
Copper, bbls....	391	276	433	325	23,332
Copper, boxes...	.....	.....	...	....	113
Copper, cakes...	160	473	319	....	18,286
Lead, pigs.....	3,935	10,439	5,414	8,680	296,582
Spelter, pieces..	1,381	2,487	3,268	604	48,704
Quicksil'r, flasks	....	...	....	87	1,308

Gold Coin.—The price of gold has ranged, during the week under review, from 100⅛ to par, and closed at par.

Copper.—There has been but very little business done during the past week. The bidding price is 15¾c. and the asking price is 16c. ; probably business could be done at 15⅞c., although we heard of that price being refused this afternoon. We publish elsewhere a statement of the copper sent to market by Lake this year. The amounts are : 28,395,368 lbs. refined copper and 9,347,733 lbs. mineral copper. This, of course, does not represent the full production of the mines. This is a very good showing, and with the enforcement of economies that can be introduced it is not probable that 1879 will show a falling off in production. In fact, the lower price of copper will more likely stimulate the companies to a larger production, that they may be able to continue their dividends.

From London, under date of December 5th, we have received the following :

"A rather quiet market for all descriptions ; and although a sale of 100 tons Chili bars is reported at £59 cash, for good ordinary brands, there are further sellers at the same figure, and, in one or two quarters, we believe, that favorite marks could be obtained at same rate. The nominal quotations are : G. O. B.'s, £59 ; favorite sorts, £59¼ ; best brands, £59½@ £60½. Wallaroo remains £68 @£69, but in the absence of business it is rather difficult to say whether sales could be made at the lower, or purchases effected at the higher rate. Burra cake is to be had at £66, and buyers seem to require a further reduction of about 10s. per ton.

Under date of the 6th inst., the following :

"Chili bars remain dull, and to-day there were sellers to a moderate extent at slightly easier rates ; buyers, however showed no disposition to operate freely, and the only business actually carried through consisted of 75 tons favorite brands at £59, cash terms. The closing quotations were G. O. B.'s, £58¾ ; favorite marks, £59 ; best brands, £59½@60½. Australian descriptions are unchanged."

Tin.—The business of the past week has been small. L. & F. has sold at 14¾@14¼c. which are the asking prices now. Straits on spot is held at 15½@15⅝c., and for arrival at 14@15c., according to time. The shipments to the United States from the Straits for the first half of December were 280 tons, making a total from January 1st of 3820 tons, as compared with 3940 tons for the same period of 1877. The shipments to Great Britain for the first half of December were 120 tons, making a total from January 1st of 3200 tons, as against 2485 tons for the like period of last year. The London quotation of Straits is £62, and the Singapore quotation, $19.

From London, under date of December 4th, we have received the following :

"Tin is rather unsettled, owing to the persistent offers of forward metal at a reduction from the cash values. We note only 10 tons, cash, at 63½s., to settle a previous 'bear' sale at 56s., for delivery this month, and 10 tons, for short arrival, at 63s. Fixed deliveries, 3 months hence, were on sale at 62½s., net, and Straits, for December and January shipment, at same price and terms. Cash metal is nominally 63½s., and difficult either to buy or sell thereat."

Under date of the 5th inst., we have received the following :

"Operators for the fall have caused a further decline in prices by expressing their readiness to accept 62½s., cash ; 61½s. for forward, if bid for parcels of 25 and 50 tons. Small lots quoted 62¾@63s."

Under date of the 6th inst., we have received the following :

"Still continues to decline, and we note sales of 20 tons from 61½s. down to 61s., cash ; 25 tons, 61½s., with three months fixed prompt ; the market closing rather sellers' at 61s., both of cash and forward metal."

STATISTICS OF FOREIGN TIN IN LONDON AND HOLLAND.

	During Nov. Imports.	During Nov. Deliveries.	Stocks. Nov. 30.	Stocks. Oct. 31.
	Tons.	Tons.	Tons.	Tons.
London:				
Australian and Straits.....	1,054	968	9,425	9,339
Banca, ex sale.....	744	280	1,704	1,240
Holland:				
Billiton.....	264	262	1,687	1,785
Australian.....	Nil.	Nil.	386	386
	2,062	1,610	13,202	12,750
In transit: Straits, 102 tons ; Australian, 20 tons.....	122	122	....	....
	2,184	1,732	13,202	12,750

	Nov. 30. Tons.	Oct. 31. Tons.
Afloat:		
Australian	1,600	2,000
Straits.....	690	260
Billiton.....	1,035	1,300
	16,527	16,310
Australian and Straits.....	£64	£60

	Estimate for 1879.	Actual Sales. 1878.	1877.	1876.
Banca sales.....	4,150	3,960	4,220	4,394
January 1st to November 30th:				
Sales of Banca by Trading Co.....		3,960	4,220	4,394
Imports, Billiton.....		3,356	2,934	3,187
" Straits.....		2,910	2,675	5,451
" Australian.....		9,287	8,303	6,940
Total brought to market.....		19,513	18,131	19,972
Actual deliveries of foreign.....		17,831	16,376	17,531
In transit (Straits and Australian)..		2,869	2,272	1,732
		1877.	1876.	1875.
Brought to market.....		18,779	20,866	22,084
Actual deliveries.....		17,723	18,220	18,704
In transit to America.....		2,534	1,833	932
January 1st:				
Stocks (England and Holland).....		10,464	7,818	4,438
Australian.....		£74½	£80½	£93½
Straits.....		£75½	£81	£95½

Tin Plates.—There is but very little business doing in these, and prices are unchanged. As the commercial depression in England is closing some of the tinplate works, it is likely to be of advantage to the market. We quote as follows : Charcoal, bright, IX, Melyn grade, $5.87½@$6, and Allaway grade, $5.75@$5.87½ ; charcoal ternes, Allaway grade, $5.25@$5.37½ ; coke, bright, B. V. grade, $5.12½, and roofing, 14 × 20, $4.70.

Messrs. Robt. Crooks & Co., of Liverpool, under date of December 5th, say of tin and terne plates :

"Charcoal tins show no alteration in price, and for cokes no advance need be quoted ; but the previous one is well sustained, and likely to be, as the makers' books are apparently well filled, and with the disposition to believe in a permanent improvement, they are unwilling to book very far ahead. Ternes are steady, and a fair inquiry exists."

Lead.—A sale made last week of 250 tons of Richmond lead has only been made public this week, the price being announced as 3·90c. The business done since our last has been entirely in a small way at 4c., which is the closing price. The Eureka Consolidated Silver Mining Company, which, by holding a large stock of its own lead, has been able to advance the price over ¾c. per lb., is still said to be strong in the position taken. According to the statement of Mr. J. B. Meader, the production of Utah fell off for the first eleven months of this year nearly 12,000,000 lbs. We are informed upon very good authority that the prospects are that there will be a still further falling off next year, owing to the scarcity of ore. Leadville (Colo.) has been unable to produce as largely this year as it might, owing to the lack of transportation, but with the coming year greater facilities are promised.

The exports of lead from London and Liverpool to China during the first eleven months of this year amounted to 9638 tons, as against 13,289 tons for the same period of 1877, and to Japan 869 tons and 1625 tons respectively.

The San Francisco *Commercial Herald* of December 12th says : "The City of Panama carried to Central America 1000 lbs. pig-lead ; the Adelaide Cooper, for Hong Kong, carried 70,000 lbs."

Spelter and Zinc.—We learn of 50 tons of spelter sold at 4·45@4½c., and quote at 4½@4⅝c. Sheet zinc is very quiet, and quoted at 5½c., at which price it is probably a little firmer.

Antimony.—There is but little business doing in this article. We quote Cookson's at 11¾@11⅞c., and Hallett's at 11⅝@11¾c.

Quicksilver.—The San Francisco *Commercial Herald* of December 12th says : "The steamship City of Panama, hence for Mexico, carried 1210 flasks. The present spot price is 40s."

THE BULLION MARKET.

NEW YORK, Friday Evening, Dec. 20, 1878.

The silver market closes fully one half-penny lower in London than a week ago, and one to one and a quarter cents an ounce in this market. The decline of the past week, while more immediately owing to uneasiness and distrust of the London money market, is primarily and mainly owing to the absence of all orders for the East Indies, and to the consequent difficulty of working off even the moderate amount that came on the market. It is thought not improbable that the German Government may be induced to sell largely of her remaining supply of silver in order to strengthen herself in gold, and if she should do this, we may certainly look for a lower silver market. The closing quotations are per ounce : In London, 49⅛d. ; here, $1.08¼ ; in San Francisco, 16 per cent discount.

The number of "unchopped" trade dollars in China is estimated at 7,000,000.

DAILY RANGE OF SILVER IN LONDON AND NEW YORK, PER OZ.

Date.	London Pence.	N. Y. Cents.	Date.	London Pence.	N. Y. Cents.
Dec. 14....	50 1-16	109⅜	Dec. 18.	50	109¼
Dec. 16....	50⅛	109½	Dec. 19.	49½	108¼
Dec. 17....	50	109¼	Dec. 20.	49½	108¼

BULLION SHIPMENTS.

We give below a statement showing the latest bullion shipments in addition to those announced in our issue of December 14th :

December	6—Jefferson.....	Nev.	.....	$1,588.22
"	7—Northern Belle.....	"	.....	4,407.62
"	9—Manhattan.....	"	.....	10,200.00
"	7—Hamburg.....	"	.....	11,319.19
"	9—California.....	"	.....	106,235.98
"	10—Hillside.....	"	.....	5,133.00
"	8—Standard.....	Cal.	.....	17,583.72
"	2—Klamath Quartz.....	"	.....	4,275.00

Government Silver Purchase.—Bids for the purchase of silver were opened at the Treasury Department on the 18th inst. Four hundred thousand ounces were purchased at prices below the equivalent of the London rate. From the bids offered it is evident the government experiences no difficulty in procuring all the silver wanted. The purchase comes principally from the mines of Colorado and Utah. Next Wednesday being Christmas, bids will be received on the 26th inst.

Coinage of the San Francisco Mint.—The coinage of the United States mint at San Francisco for the month ending November 30th, 1878, was as follows :

Gold—Double eagles, 115,000 pieces ; value, $2,300,000 ; half eagles, 20,000 pieces ; value, $100,000 ; quarter eagles, 8000 pieces ; value, $20,000 ; total gold, 143,000 pieces ; value, $2,420,000. Silver—Standard dollars, 1,250,000 pieces ; value, $1,250,000 ; total coinage, 1,393,000 pieces ; value, $3,670,000.

During the present week gold reached par and has since been steady at it. The highest points reached were 285 in 1864 and 233¾ in 1865.

The production of the Ontario Silver Mining Company, from the 4th to the 13th inst., inclusive, was $53,796.58, assay value. The mill started on the 2d inst., the first shipment since the regular resumption of operations being on the 4th inst.

Salt Lake Ore and Metal Market.

SALT LAKE CITY, Utah, Dec. 20, 1878.

Argentiferous Lead (Base Bullion), $35 per ton for lead ; $1.12½ per ounce for silver ; $20 per ounce for gold. The quotations for silver are based upon the silver in the lead of 80 to 120 ounces per ton of 2000 lbs.

The Ouray (Colo.) *Times* says a trial run of 105 tons of ore gave 25 tons of bullion, worth between $175 and $500 per ton at the works.

San Juan has sent eastward, by rail from Alamosa, during the past season ending Nov. 30th, 1,345,570 pounds of bullion and 188,970 pounds of ore.

FINANCIAL.

New York Stocks.

NEW YORK, Friday Evening, Dec. 20, 1878.

The week under review has been a very active one at the Stock Exchange for the coal stocks. The sales of Delaware and Hudson Canal aggregated the unusually large amount of 42,241 shares at 37⅛@36⅞@

COAL STOCKS.

Name of Company.	Capital Stock.	Shares. No.	Par Val.	Last Dividend.	Rate per Ann.	Quotations of New York stocks are based on the equivalent of $100. Philadelphia prices are quoted, so much per share. Dec. 14. H.	Dec. 14. L.	Dec. 16. H.	Dec. 16. L.	Dec. 17. H.	Dec. 17. L.	Dec. 18. H.	Dec. 18. L.	Dec. 19. H.	Dec. 19. L.	Dec. 20. H.	Dec. 20. L.	Sales.
	$		$	Mo. Y. A't.	Per c'nt													
Consol. Coal.	10,250,000	102,500	100	Jan. 77 2½	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Del. & H. C..	20,000,000	200,000	100	Aug 76 4	9	37⅛	36⅞	37⅝	36⅞	37⅛	37	37⅛	37	37¼	36⅞	37¾	37¼	42,241
D., L.&W. RR	26,200,000	524,000	50	July 76 2½	5	43⅜	42	43¼	42⅛	43¼	41⅞	43	41¾	42⅞	42	43⅛	42⅜	207,700
Lehigh C.& N	10,448,556	208,971	50	Nov 76 1½	5½	15	14¼	.....	.....	14⅜	14½	14⅝	14⅜	14¾	14¼	15	14½	1,138
Leh. V'y R. R	27,228,855	540,858	50	Dec 78 1	4	34¾	34¼	34⅞	34¼	34⅝	34	34¼	34	34½	34¼	34⅜	34¼	2,329
Maryl'd Coal	4,400,000	44,000	100	Jan. 76 1½	1½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
N. J. C. R. R.	20,600,000	206,000	100	Apr 76 2½	2½	21½	28½	30¼	28¾	30¼	29⅜	31⅜	29½	31⅜	30⅜	33	30¾	111,479
Penn. Coal...	5,000,000	100,000	50	May 78 3	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Penn. R. R...	68,870,200	1,337,404	50	Nov 78 2	8	32	31⅝	32⅜	32	32⅝	32¼	32¼	32	32¼	32	32¾	33⅛	21,378
Ph. & R. R. R	34,278,175	685,563	50	Jan 76 +2½	10	12¼	11⅞	12⅝	12¼	12⅜	12⅛	12⅜	12⅛	12¼	12¼	12⅜	12¼	16,67

The Delaware and Hudson Canal Co. has paid in dividends to date $38,821,104, and the Philadelphia and Reading $43,012,497.

Total Sales..... 335,564.

37¾, closing at $37¾. Delaware, Lackawanna, and Western R. R. sales amount to 207,700 shares at 43⅝@41⅛@43¾, closing at 43½. New Jersey Central, with sales of 11.479 shares, ranged between 28½ and 33, closing at 32⅞. What we have frequently stated has been again demonstrated during the past week; that the prospects of the coal-carrying roads have nothing to do with the market value of the securities of the companies. An auction sale of 100,000 tons of coal was announced, indicating that the Delaware, Lackawanna, and Western Railroad Company did not believe that there would be a combination in 1879, and the coal sold at a decline of 70c. per ton, reducing prices to what have in the past been pronounced as "ruinous," and yet the stocks of the companies advanced in price.

It is again rumored that the Baltimore and Ohio Railroad is about to make arrangements for making connections with the Bound Brook line and running through trains into Jersey City *via* the New Jersey Central Railroad.

Miscellaneous Stocks and Quotations.

Sales and quotations of the stocks and bonds dealt in here, at Philadelphia and Baltimore, for the week ending the 20th inst. are given in the following tables. The Philadelphia quotations will have a * affixed. The Baltimore quotations are indicated thus †.

Stocks.	Par Value.	High'st	Lowest	Closing	Sales: Shares.
American Coal Co.	$25	. . ..	.....	30	.....
St.L.,I.M.& S.R.Co..	100	.....	.....	14	.....
Spring Mt. Coal Co.	50	.....	.....	50	.....
*Cambria Iron Co..	50	.....	.....	59	.....
*Penn. Salt Mf'g Co.	50	....	.....	68	62
*Westm'land C. Co.	50	.....	.....	45½	2
*Buck Mt. Coal Co..	50	.....	.....	38	....
*Schuyl. Nav. Co...	50	.....	.....	... .	.....
†B.&O.RR.Co.1st pf	.....	.....	.....	95	.....
†B.&O.RR.Co.2d pf	100	.....	.....	92	.....
" " " " com	90	....	.....	88	.....
†George's C'k C. Co	100	.....	.....	86½	.....
†S. Clara M'g Co...	100	.....	.....	25	.....
†Atlantic Coal Co.	10	.....	.....	75	.....

Bonds.	Princ'l. When Due.	Int'est. When Due.	Hig'st.	Lowest	Amount.
D., L. & W., 7s, conv	1892	J. & D.	100⅛	.....	2,000
" " " 2d mtge.	1881	M. & S.	.....	.....	.....
N.J.C.,1stmtge.new	1890	F. & A.	115	.....	1,000
" " 1st mtge.,con	1899	Q.	72½	70	*100,000
" " " convt.....	1902	M. & N.	85½	..	†15,000
Lehigh & W. B., con	1899	Q.	53	52	15,000
Am. Dock & Imp. 7s	.....	J. & J.	48	45¾	*26,000
St.L.I.M.& S..1st mt	1892	F. & A.	109¼	109	8,000
Ches. & O., 1st mtge	1899	M. & N.	....	.....	.....
D & H C Co.,1stm.rg	1884	J. & J.	97	.....	3,000
" " " " "	1891	J. & J.	95½	.....	6,000
" " " " m.loan cp	1894	A. & O.	94	.....	2,000
" " " " rg.	1894	A. & O.	93⅛	93⅜	10,000
" " " " new mge.	.....	.....	.....	.....	.....
*L.V.R.,1stm.6s.cp.	1898	J. & D.	110	.....	1,000
" " " rg.	1898	J. & D.	...	.....	.....
" " 2d m. 7s,rg.	1910	M. & S.	115	.....	1,000
" " con.m.6s,rg	1823	J. & D.	97½	.....	2,000
" " 6s cp.	1923	J. & D.	....	.....	.....
*P.a.RR.,1st m.6s,cp	1880	J. & J.	105¼	.....	4,000
" " g. m., 6s, cp.	1910	J. & J.	....	.....	.....
" " " 6s, rg.	1910	A. & O.	110¼	.....	1,000
" " con.m.6s,rg.	1905	Q.	...	.....	.....
" " " 6s, cp.	1905	J. & D.	99¾	99¼	7,000
" " new loan, 5s	.....	.....	.....	.....	.....
*P.& R. R., 1st m.6s, R. C. 43-44.....	1880	J. & J.	.....	.....	.....
P. & R. R., 1st m. 6s, R. C. 48-49.....	1880	J. & J.	.....	.....	.....
P.& R. R.,2d m.7s cp	1893	A. & O.	.....	.....	.....
" " " scrip....	1882	J. & J.	.....	48½	.....
" " " in.m.7s,cp	1896	J. & D.	.....	.....	.....
" " " c.m.7s,cp.	1911	J. & D.	97½	.....	8,000
" " " 7s. rg.	1911	J. & D.	98	97¾	10,000
" " " cvt.7s,R.C	1893	J. & J.	....	45	.....
" " C.& I.Co.,Deb 7s, R. C.....	1892	M. & S.	.....	.....	.....
& R.C.& I. Co., m. 7s, R. C.....	'92-3	various	.....	.....	.....
L. Nav. Co.,6s,rg.m.	1884	J. & Q.	105	104	3,400
" " RR., rg. m.	1897	F. & Q.	.....	.....	.....
" " cvt. co. G. R.	1894	M. & S.	.....	.....	.....
" " " Gold R. C.	1897	J. & D.	91	.....	3,500
" " con.m.7s,rg.	1911	J. & D.	.....	.....	.....
*P.& N.Y.C.,7s,R.C.	1896 / 1906	J. & D.	113½	.....	1,000
*Pa Canal, 6s. cp..	1910	J. & J.	65⅛	.....	6,000
*Schuyl.Nav.,1st m. 6s. rg.....	1897	M. & Q.	.....	80	.....
*Sus.Coal, 6s, rg...	1911	J. & J.	.....	.....	.....
†Balt.&O. RR., 6s..	1880	J. & J.	.....	.....	.....
" " " 6s..	1885	A. & O.	.....	.....	.....

Total transactions for the week.....$235,900

* Assented. † 14,000 assented, selling at from 71@70½.

Philadelphia Stocks.

Philadelphia, Friday Evening, Dec. 20, 1878.

With all the disturbing influences at work in the coal trade, there has been but little change in the prices of the coal stocks dealt in in this market, and the business done has not been even an ordinarily active one. Lehigh Coal and Navigation Company has been dealt in to the extent of but 1138 shares, at $15@$14⅛@$15. Lehigh Valley Railroad has been dealt in to an unusual extent for that stock, the sales amounting to 2329 shares at $34⅛@$34@$34⅜. Pennsylvania Railroad records sales of 21,378 shares, at $32⅝@$32. Philadelphia and Reading Railroad ranged from $11⅞ to $12⅝, the aggregate of sales being 16,678 shares.

The United Companies of New Jersey announce a quarterly dividend of 2½ per cent, payable January 10th, 1879.

Gas Stocks.

New York, Friday Evening, Dec. 20, 1878.

Nothing has arisen during the past week to disturb the dull condition of the market. Stocks seem to be on a slow but steady decline, and from the present aspect very likely to continue in the same direction. Experiments and improvements on the electric light are coming in so fast that it is impossible to answer the question of the day, "Are the streets to be lighted by electricity?" and on the answer depends the future of the gas-stock market.

The Chicago Gas Question.—There was another protracted meeting last week between the Committee of City Council of Chicago and the West Side Gas Company, but no definite results were arrived at; the representatives of the gas company apparently declined to make any offer on the new terms until old matters were straightened out. The South Side Company agreed to furnish gas for the street lamps including only cleaning, repairing, except glass, and thawing, for $21.50 per year, for 27 nights each month, and gas for the city buildings at $1.65 per thousand. No conclusion was arrived at.

The Gas Companies Waking Up.—We are informed on good authority that the Manhattan Gas-Light Co. is experimenting with the electric light at its works, corner of Fourteenth street and Avenue C.

The Cleveland (O.) Gas-Light and Coke Co. manufactures 155,000,000 feet of gas per year.

The gas bill of Cincinnati, O., for lighting the public lamps during the month of November amounted to $10,734.01.

The cost of lighting the city of Montreal, Can., for the current year is stated at $37,719.

San Francisco Gas Co.—Recent sales of this stock of some 500 shares have been made at from 85 to 85¼, which is quite a decline.

Metropolitan Gas-Light Co.—During the week twelve shares of this company's stock sold at auction for $97 per share.

The Boston Gas-Light Co.—During the week 9 shares sold at auction at from $650@$640 per share.

The following list of Companies in New York and vicinity is corrected weekly by George H. Prentiss, Broker and Dealer in Gas Stocks, No. 30 Broad street, New York:

Companies in New York and Vicinity.	Capital Stock.	Par.	Dividends. Rate per ann.	Dividends. Am. of last.	Dividends. Date of last.	Quotations Bid.	Quotations As'd.
	$		P. ct.				
Mutual, N. Y....	5,000,000	$100	6	1½	Oct., '78	55	58
" Bonds...	90,000	1,000	6	3½	Aug., '78	90	96
N. York "	4,000,000	.....	8	4	May, '78	78	80
Metrop. "	2,500,000	100	10	5	Aug., '78	97	101
" Certfs...	1,000,000	.....	7	3½	" '78	90	95
Harlem "	1,850,000	50	0	3	Feb., '78	26	35
Manhat. "	4,000,000	50	....‡	5	May '78	115	155
Brooklyn, Bkln.	2,000,000	50	15	5	Apr., '78	118	122
Nassau	1,000,000	25	....‡	3	July, '78	50	55
" Certfs...	700,000	1,000	7	3½	May, '78	80	85
People's.....	1,000,000	10	....‡	3½	Jan., '76	15	20
" Certfs....	300,000	1,000	7	3½	July, '78	75	90
" Bonds....	325,000	.....	7	3½	May, '78	90	96½
Metrop. "	1,000,000	100	5	2½	May, '78	50	60
W'msb'g "	1,000,000	50	8	1½	July, '78	65	75
" Certfs...	1,000,000	.....	7	3½	July. '78	85	90
Citizens'.....	1,200,000	20	....‡	3	July, '78	50	60
" Certfs...	320,000	1,000	7	3½	Apr '78	90	95
J. C., N. J.....	750,000	20	10	7½	July, '78	120	140
Municipal, N. Y.	466,000	50	.....	.....	.....	76	85
" Bonds..	750,000	.....	.....	.....	.....	.....	...
.....	.....	.....	.....	.....	.....	.....	...

Copper Stocks.

Reported by Wilson W. Fay & Co., Brokers in Mining and Miscellaneous Stocks, Room 7, Traveller Building, 31 State street.

Boston, Wednesday Evening, Dec. 18, 1878.

The market has been moderately active during the week. Most of the "coppers," with the exception of Calumet and Hecla being firm, while the "silvers," on the contrary, were very weak. The transactions are still confined to a few stocks, viz.: Calumet and Hecla, Copper Falls, Osceola, and Quincy, among the "coppers," and Duncan and Silver Islet in the "silvers," the others making an average of about one sale a fortnight and being therefore a very small help to the list of transactions.

Calumet and Hecla has declined to 174¾ bid and 175 asked, and sales at 175.

Copper Falls has sold down to $1, and closes firm at $1@$1 1-16, the directors buying all they can at $1.

Franklin is quiet at 4@5.

Osceola is very quiet at 10¾@11¼, the last being at 11⅛.

Pewabic is also quiet at 1@1½.

Quincy has been quite active, there being large lots of stock bought and sold, the price advancing to 13¾ bid and 14¼ asked, and closes firm at those figures.

Ridge is also quite firm at 1⅛@1⅜, and no sales.

Duncan has sold down to $3 from some unexplainable cause, very few offering any explanation for it except the long-expected assessment, and if that is the only reason for the decline the stock is a good purchase at present figures; it closes at 3¼@3⅝.

International is quiet at 37@40c., and sales at 37@40c.

Silver Islet has sold down to $40, but shows rather an upward tendency at the close. The last quotation on it was 37½@42.

Gold and Silver Stocks.

New York, Friday Evening, Dec. 20, 1878.

A very active interest is being shown in the movement to turn the Gold Room of the New York Stock Exchange into a Mining Board. The petition for this purpose, seeking the signatures of the members of the Stock Exchange, has received over a hundred additional names since our last. Those interested in Homestake, Carbonate, Empire, Penobscot, Adlaide, New Philadelphia, and that class of mines, are anxiously awaiting some action in this direction. The understanding which exists with the Mining Exchange, that the New York Stock Exchange will not list any more mines, is the only thing that stands in the way of its accomplishment. The change, with a thorough revision of the existing list of mines and members, and the addition of a number of dividend-paying properties will advance mining more than any action that can be taken at the present time. The only opponents to the change are likely to be the patrons of the "five-cent gambles." The pressure is so strong in favor of reform and a responsible Mining Exchange, that if the New York Stock Exchange does not list mining stocks, a new Mining Board will probably be started. The probabilities are that the former will be done, and, for the good of the mining interests, it is to be hoped that it will.

Were this accomplished, there are a number of fully-developed and profitable mines that would be capitalized and placed on this market. As it now is, the owners watch the transactions of the Mining Exchange for a few days, and say, "You have no market for mines in the East." This, however, is a mistake, for worthy mines properly reported upon as to value and ability to earn dividends, by mining engineers of good standing, and as to titles by good legal authority, readily find a market when placed in the hands of a responsible banking house. The interest in mining, although of very rapid growth, is yet in its infancy, and in the absence of other profitable fields for the investment of accumulated capital, is likely to become a leading interest in the East. If so, it will be upon a much more permanent basis than any past speculation in this direction.

The week at the Mining Exchange has been a quiet one, yet the business in the more important stocks has been up to the usual dealings. Sutro Tunnel has attracted more attention than at any time since it was entered on the list of the New York Stock Exchange. The sales for the week aggregate 6200 shares at $4⅞@$3½. Ontario has only been dealt in to the extent of 40 shares at $39¼. In the San Francisco stocks there has been a fair business. We note the following sales: Belcher, 100 shares at $4¼; California,260, at $10½@$9⅝; Consolidated Virginia,515, at $8¼@$7¾; Crown Point, 100, at $4⅝; Gould & Curry, 250, at $8¼@$8½; Independence, 1680, at $1.60@$1.25; Leeds, 10, at $1¼; Savage, 125, at $9⅝; Yellow Jacket, 50, at $15½; Alpha, 200, at $9¼; Bullion, 300, at 5½@$4½; Julia, 700, at $3½@$3.15; Kossuth, 300, at 20c.; Leviathan, 600, at 35@40c.; Mexican, 70, at $30@$29; Navajo, 1050, at 60@45c.; and Overman, 5, at $11. We have never had such an array of San Francisco stocks dealt in at the Mining Exchange in any previous week. In fact, the above list is much greater than that of the stocks of the regular list dealt in during the past week. Although dealing in the Comstock stocks is gambling against stacked cards, yet the dealings in this market are another indication that the Eastern public is taking an interest in mining.

The dealings in the leading stocks on the regular list of the Mining Exchange have been as follows: Hukill, 1650, at $3.90@$3.40; Moose, 300, at $4.40@$4.60; Plumas, 425, at $3.80@$3.60; Findley, 3500, at 67@65c. With the exception of Hukill and Findley the transactions have been small. Findley is doing very well, the net product for last week being about $600.

The fancies have been dealt in to a fair extent. We note the following transactions: Bertha and Edith, 45,200, at 11c.@8c.; Buckeye, 2700, at 55@50c.; Dahlonega, 17,300, at 17@14@18c.; Gold Placer, 34,400, at 28@23c.; American Flag, 2100, at 22@20c.; and Lacrosse, 39,200, at 34@30c. The usual efforts to form "corners" and talk of great "short" interests, prevail in these stocks.

Silver Islet, a description of which we publish in this number of the Journal, has sold on the Boston market at $44¾@$40 per share.

The Empire Gold Mining Co. has announced a dividend of 10c. per share, payable from the earnings of November, at the office S. V. White, Treasurer, No. 8 Wall street, to-morrow.

The pay-roll of the Sutro Tunnel has averaged $12,000 for some months past, but it will probably reach $15,000 to $18,000 for some months to come, as the cutting out of the drain and the shortening of the shifts will compel a very material increase in the

working force. About one hundred men are now employed in and about the tunnel. The south branch was in 893 feet on the 11th inst.

Messrs. Trask & Francis have established a reading-room in connection with their offices, where the leading mining papers are kept on file, the quotations of mining stocks as reported from all of the leading cities are posted, and prospectus maps, etc., are arranged for the use of the public. The object of this department is to encourage an interest in mining by a free circulation of information on this subject.

From the Denver *Tribune* we glean the following information: "Ten tons of ore from the Cashier sold for $1,583.32. The Hukill placer claim is again paying. Although Caribou is somewhat dull, the Caribou and Native silver mines are both turning out a great deal of good silver ore."

There is a probability of the two latter mines being consolidated and offered for sale on this market.

The Leadville *Reveille* is authority for the following astounding information:

"The Adlaide mine is increasing in bulk of ore, and also in its percentage of silver and gold. Nine ounces of gold per ton is good enough without counting 560 ounces of silver. But this is lean as compared with the new strike of the Double Decker mine adjoining, from which assays have returned 280 ounces silver and 22 ounces in gold. But this is not all (we want to tell it gradually), the latest assay has risen to 1513 ounces silver and 72 ounces in gold per ton."

The American mine at Sunshine, Colo., is said to have yielded some good ore.

The ore in the Kearsarge mine of Utah is improving, a small shipment of ore yielding $100 per ton having been made on the 13th inst., according to the *Salt Lake Tribune*.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY	CLOSING QUOTATIONS						Open-ing D 2
	Dec. 13.	Dec. 14.	Dec. 16.	Dec. 17.	Dec. 18.	Dec. 19	
Alpha	9	9	8⅞	9½	9⅛	9¾	9
Alta	5¾	5½	5¾	6	5⅝	6	5½
Argenta							
Bechtel							
Belcher	4	4	4	4	3⅞	3¾	3¾
Belle Isle							
Benton							
Best & Bel.	18½	18½	18¼	18	17¾	17¾	17½
BlackHawk							
Bodie	13	11½	10⅝	9	9⅛	10	
Booker							
Bullion	4⅞	4¾	4⅞	5	4½	4½	4¼
Bulwer							
Caledonia	2	2	2½	2⅝	2¼	2⅜	2½
California	10⅝	10⅜	7½	9¾	9⅝	9½	9½
Chollar-Pot	38	39	38	30½	39	39	38½
Confidence	8¼		8	8	8¾	9	
Con. Imp							
Con. Va	7¾	7¼	7¾	7⅝	8	7¾	7¾
Crown P'int	4¼	4	4	4	3¾	3⅜	3¾
Endowm'nt							
Eureka Con	35¼	34¼	34¼	35¼	34¾	35¾	
Exchequer	3¾	3⅞	3¾	3⅞	3⅝	3½	3¾
Goodshaw							
Gould & Cur	8⅛	8½	8	7⅝	6¾	8½	8½
Grand Prize	8⅝	8¾	8⅛	7¾	7¼	7½	
Hale & Nor.	11	10¼	11¼	11¼	10¾	10½	
Hamburg							
Homestake							
Hussey							
Indep'd'nce							
Jackson							
Julia Con	3½	3¼	3⅛	3	3	3	
Justice	4	4	4⅛	4½	4	3⅞	
Kentuck	4		3¾	3⅝	3⅞	3¾	
Kossuth							
Leopard							
Leviathan							
Manhattan							
McClinton							
MeadowVal							
Mexican	28¼	28½	28¼	29	27½	28¾	28½
Mono							
Navajo							
North. Belle	9¾	9¾	2¾	10	9¾		
Ophir	40¾	39¾	40	39	37	38	36½
Orig. K'ys'e							
Overman	10¼	9⅞	9¾	9¾	9¾	9½	10
P. Sheridan							
Ray. & Ely	10½	10¼	10⅛	8⅛	8½	9	
Richer	10	10					
Savage			9½	9¾	9¾	9⅛	9¼
Scorpion						1	
Seg. Belcher							18
Sierra Nev.	49½	50	50¼	50½	47		47
Silver Hill	1¼		1½		1½	1¼	1¼
Silver King							
Summit							
Tioga							
Tip Top							
Union Con.	60¼	60	60	59	55		56½
Utah							13
Ward							
WashoeCon							
Wells Fargo							
Yel. Jacket	13¾	13¾	15⅛	15	14		14½

REVIEW OF THE SAN FRANCISCO MARKET.

The general tendency of the San Francisco Stocks, judging from the opening quotations to-day, are to lower prices, though other quotations of the week were considerably in advance of these. The list seems to have partially cut loose from the influences of the new bonanzas, and in many instances we note advances in face of the gradual decline of stocks that but a few weeks ago ruled the market.

Alta is fairly maintained, the north drift on the 1550 level is steadily advancing alongside of the ore vein in very soft ground. The bottom of the winze below the 1450 level is still in ore of a fine, healthy character. Every thing running well, and work progressing well at all points.

Sinking the new shaft of the Best & Belcher mine is making good progress. It is now down 375 feet. The stock is fairly maintained.

In the Caledonia the flow of water from the east drift on the 1600 level has been quite strong. This drift is advancing at the rate of four feet per day, the face in vein porphyry, streaked with quartz. The north drift on the 1600 level is making good headway, the face still in hard blasting rock. This stock opens at nearly the best price of the week.

We have no special feature to note in the old bonanzas. Consolidated Virginia is quite firm, and a slight decline is noticed in California. The most active operations are being conducted in both of these mines.

Exchequer is fairly maintained, the face of the drift on the 2400 level is in very hard blasting porphry. Eureka Consolidated closed yesterday at $35¾, the best price of the week; this mine continues its regular output of bullion, and the several levels are looking first-rate. We note the statement that the Richmond mine, adjoining the Eureka (owned by English capitalists), has developed the largest body of ore ever found in the mine. It has already been uncovered a perpendicular distance of 120 feet, and cross-cut on until its proportions justify the claims made for it. It is also of a very high grade, as assays taken from many places demonstrate. The discovery insures the continued operations of three or more furnaces for a year to come, and probably a longer period, and the constant employment of between five and six hundred men at the mine, refinery' and reduction works.

Grand Prize is lower, closing yesterday at $7½ against $8⅝, as in our last. The stopes in this mine are looking well and the mill is running to its full capacity. We have no quotation of Hamburg; the stock is selling in small lots in San Francisco at from 90c. to $1.50. This company's furnace was closed down on the 5th inst., after a very successful run, during which it shipped 207 tons bullion, produced from 1240 tons Hamburg ore and 103 tons purchased ores—an average of about 672 tons ore to ton of bullion. The mine continues to look well, the daily yield of ore being from 25 to 30 tons.

Gould & Curry opens at well-maintained prices. Sinking the joint Obiston shaft is considerably interfered with on account of an increase of water in the bottom. Kentuck shows a slight decline.

A small amount of ore is being extracted daily from the old upper workings of this mine, which by careful assorting assays from $25 to $30 per ton.

Julia and Justice closed yesterday at lower prices. The extraction of the ore from the Justice is of a fair grade, and will pay well to mill. The appearance of the Julia mine is quite favorable, yet the stock does not respond.

Lady Bryan is freely selling in San Francisco at from $1.10 to $2 per share. Active operations are in progress throughout all parts of this mine. Manhattan is steady in San Francisco at from $4.15 to $4.50 per share. The mill of this company is now reducing per week about 123 tons of ore, which has an assay value of $26,071.15. Recent mail advices from the mine state that it is looking unusually well in all parts.

The latest advices from Leviathan are encouraging. It was selling in San Francisco, according to latest mail advices, at 30@50c. Navajo shipped 5700 bullion on the 9th. This stock was selling in San Francisco, according to the mail advices, at 40@50c., and was quite active. The superintendent's letter from Hussey, on the 6th inst., spoke of an improvement in the north cross-cut, on the 400-ft. level. Otherwise there was no change. Hussey was sparingly dealt in in San Francisco, at 40@50c. for the week ending December 11th.

Mexican is well maintained. Sinking the joint Union Consolidated winze below the 1600 level is making fair progress. It is now down 105 feet on the slope, the bottom in hard-blasting porphyry. The main drift connecting with the Ophir shaft is being enlarged and put in the best of working order, it being intended, when connected with the North Consolidated Virginia shaft, for a large air gallery, and a base from which to prospect the entire mine on that level.

At the annual meeting of this company on the 3d inst., the control of the mine was not changed, the bonanza firm carrying the election of directors without opposition.

The stock of the North Bonanza Mining Company is very active in San Francisco, but selling at lessened rates. Our contemporaries speak well of the appearance of this mine, but private advices raise considerable doubt as to its extolled value.

Ophir opens to-day at decidedly the lowest point of the week, viz.: $36½, against $41¾, as in our last. This mine has commenced the shipment of ore, said to be of high grade, and had some 600 tons on the dump to begin with.

The railroad fever is certainly strong in Colorado. A late number of the Denver *Tribune* announces the filing of articles of incorporation of four new railroads. In addition to these we note a project to build a road from Georgetown to Deadwood in the Black Hills. All of these schemes are so far only on paper.

Raymond & Ely stock is lower, closing last night at $9, against $10¾ a week ago. A considerable amount of good ore is being taken out of the Burke mine, owned by the Raymond & Ely Co. This company is making regular shipments, and the mine is looking well. Overman is fairly steady, with no important changes to note in the mine.

Savage is steady at $9¼ per share. The water in this mine stands at a point 45 feet below the 2000 level. The joint east drift on the 2000 level is making good progress, the face being in much harder rock than for some time past. It is now in a distance of 630 feet. The east cross-cut on the 2100 level is making steady progress, and the face is still in very soft favorable vein matter.

Silver Hill is steady at $1¼ per share. Recent information from this mine states that excavating the 1100 station is making rapid progress. The bob-pit is completed, also the waste and ore-shutes at that point. The St. Louis drift is making good headway. Our private advices regarding this property are unfavorable.

Sierra Nevada opens to-day at the lowest of the week, and the lowest since the recent reaction. The *Graphic* dispatches of to-day say that "the incline is down 75 feet, the whole face showing rich ore." Our contemporaries, without exception, report favorably on the appearance of this mine. Regarding the recent compromise between this company and the Union Consolidated, we note that the length of both claims is 4155 feet. The maps give 3300 to the Sierra Nevada, and 825 to the Union Consolidated. The northerly 298 feet of the Union ground has been the bone of contention. In the compromise agreed upon, of the 298 feet in dispute, the Union people give the Sierra Nevada people the northerly 250 feet adjoining their mine, and the Sierra Nevada people concede to the Union people the southern 48 feet adjoining their mine. This settlement gives the Union mine 575 feet of undisputed ground, and the Sierra Nevada mine 3550 feet of undisputed ground—a settlement which appears to satisfy all parties. Union Consolidated is also lower, though the general tendency of this stock is to higher figures than that of its contemporary. Whether the probability that this stock is more outside of ring influence than that of its contemporary, or that it is more in bonanza, the public must judge. Certain, it is, we hear less of bonanza, and better figures in the Union.

Trojan is selling in San Francisco at 25@30c. The mill of this company was started on the 1st inst. with a supply of 1150 tons of ore

Utah opens to-day at $13. There is no special feature from this mine.

Yellow Jacket is fairly maintained, opening at $14½, against $14 last week. The new shaft is down over 2000 feet, bottom in hard blasting ground. The top of the new shaft is 92·48 feet higher than the top of the old one, consequently it has 269 feet yet to sink in order to reach the 2200 level east drift, which was run some months ago, to a point directly beneath, in order to meet and connect with it. When this connection is made the Yellow Jacket mine

GENERAL MINING STOCKS.

Dividend Paying Mines.

NAME AND LOCATION OF COMPANY.		Feet on Vein.	Capital Stock.	SHARES. No.	Par Val	ASSESSMENTS. Total levied to date.	Date and amount per share of last.	DIVIDENDS. Total paid to date.	Last Dividend.	Rate p. An	HIGHEST AND LOWEST PRICES PER SHARE IN CURRENCY AT WHICH SALES WERE MADE. Dec. 14. H.	L.	Dec. 16. H.	L.	Dec. 17. H.	L.	Dec. 18. H.	L.	Dec. 19. H.	L.	Dec. 20. H.	L.	SALES.
Alps	Nev.	800		30,000		204,000	Aug. 1878 $1 00	37,500	Apr. 1876	$0 05													
Belcher, G. S.	Nev.	1,040	10,400,000	104,000	100	1,392,200	Oct. 1878 1 00	15,397,200	Apr. 1876	1 00									41¼				100
Bobtail, G.	Col.	2,500	1,136,630	227,326	5	*		56,831	Nov. 1877	25													
Bobtail Tunnel, G.	Col.		100,000	20,000	5	52,000	July 1873 0 30	48,000	June 1878	50													
Bodie, G.	Cal.		5,000,000	50,000	100	25,000	Feb. 1878 0 50	750,000	Dec. 1878	1 00													
California, G. S.	Nev.	600	54,000,000	540,000	100			29,700,000	Dec. 1878	1 00			10¼	9½	9¼	9½	10	9¾	9¾	9½	9⅝		260
Calumet & Hecla, C.	Mch		2,000,000	80,000	25	1,200,000		13,450,000	Aug. 1878	5 00	176		176		175								110
Central, C.	Mch		500,000	20,000	25	100,000	June 1862 0 65	1,260,000	Feb. 1877	5 00													
Chollar Potosi, G. S.	Nev.	1,400	2,800,000	28,000	100	1,750,000	Sept. 1878 5 00	3,080,000	Feb. 1872	1 00													
Copper Falls, C.	Mch		1,000,000	20,000	50	535,000	May. 1876	100,000	Nov. 1871	1 00			1										300
Cons. Virginia, G. S.	Nev.	710	54,000,000	540,000	100	474,600	June 1873 3 00	40,500,000	June 1878	1 00	8¼	8	8	7⅞			7¾		8		8¼	8	515
Confidence, G. S.	Nev.	130	2,496,000	24,960	100	256,320	Apr. 1878 0 50	78,000	May. 1865	8½													
Cons. Her. & Roe	Col.	16,500	1,000,000	100,000	10	*																	
Crown Point, G. S.	Nev.	600	10,000,000	100,000	100	1,873,370	Sept. 1878 1 00	11,588,000	Jan.. 1875	2 00									4⅛				100
Daney	Nev.	2,000		108,000		91,850	Nov. 1878 0 20	56,000	July 1863														
Eureka Cons., G. S. L.	Nev.		5,000,000	50,000	100	100,000	May. 1876 1 00	3,250,000	Nov. 1878	3 00													
Eureka G. Mg., G.	Cal.	1,650	2,000,000	100,000	100			2,140,000	Apr. 1878	0 25													
Findley, G.	Geo.		200,000	200,000	1			20,000	Dec. 1878	10	67c		67c	66c	65c		66c	65c					3,500
Franklin, C.	Mch		500,000	20,000	25	360,000	June 1876 5 00	585,000	Nov. 1871	1 00													
Gila	Ariz			100,000		50,000	Aug. 1878 0 25	50,000	Aug. 1875	0 25													
Gould &Curry, G. S.	Nev.	612	10,800,000	108,000	100	2,828,000	Nov. 1878 1 50	3,826,800	Oct. 1870	10 00							8¼				8¼		250
Grand Prize	Nev.	1,500		100,000		100,000	July. 1878 1 00	400,000	Feb. 1878	1 00													
Hale & Norcross, G. S.	Nev.	400	11,200,000	112,000	100	2,911,000	Aug 1878 1 00	1,593,000	Apr. 1871	5 00													
Hukill, G. S.	Col.	3,238	1,000,000	100,000	10	*			Dec. 1878	0 10													
Independence	Nev.	1,500		100,000		75,000	Feb.. 1878 15	150,000	Nov. 1878	25	1.60	1½	1.60	1.40	1.55	1.45	1½	1.40	1.40		1.30	1¼	1,680
Kentuck, G. S.	Nev.	95	3,000,000	30,000	100	300,000	Aug. 1878 1 00	1,252,000	Mar. 1879	5 00													
K. K. Cons.	Nev.			50,000		250,000	Nov. 1878 1 00	50,000	Sept. 1872	0 25													
Leeds	Uth.	3,000		60,000				78,000	Oct. 1878	0 15											1¼		10
Leopard, G. S.	Nev.	1,500	5,000,000	50,000	100	175,000	Oct.. 1878 50	162,500	Dec. 1876	0 50													
Manhattan	Nev.			50,000		50,000	Oct.. 1873 1 00	400,000	Feb. 1877	1 00													
Merrimac, S.	Mas.	1,500	500,000	100,000	5	*	June	120,000	Mar.														
Minesota, C.	Mch.		1,000,000	20,000	50	436,000	1869 1 00	1,820,000	Mar. 1876	0 50													
Modoc	Cal.	4,000		140,000		400,000	Nov. 1878 0 50	50,000	Dec. 1876	0 50													
Moose	Col.	39,000	2,000,000	200,000	10	*		550,000	Mar. 1878	0 25			4 40		4.60								300
National, C.	Mch.		500,000	20,000	25	195,000	Oct.. 1875 1 00	360,000	Oct. 1873	1 00													
N. Y. & Colorado, G.	Col.		1,000,000	50,000	20	*		20,000	Mar. 1877	0 20													
Northern Belle, S.	Nev.	1,600	5,000,000	50,000	100			1,425,000	Feb. 1878	1 00													
Ontario.	Uth.	3,000	10,000,000	100,000	100			1,900,000	Dec. 1878	50									39¼				40
Ophir, G. S.	Nev.	675	10,080,000	100,800	100	3,430,850	Nov. 1873 1 00	1,791,400	Mar. 1864	4 00													
Pewable, C.	Mch.		500,000	20,000	25	185,000	June 1868 3 00	430,000	July 1873	1 00													
Phœnix, C.	Mch.		1,000,000	20,000	50	817,500	Sept. 1870 3 00	10,000	Dec. 1876	1 00													
Plumas	Cal.		1,000,000	100,000	10			100,000	Dec 1878	10			3.80				3.60		3.60		3.65		425
Quincy, C.	Mch.		200,000	20,000	10			2,200,000	Feb. 1878	5 00	13¼		13¼										735
Raymond & Ely, G. S.	Nev.	5,000	3,000,000	30,000	100	630,000	Oct.. 1878 1 00	3,075,000	Sept. 1873	3 00													
Ridge, C.	Mch.		500,000	20,000	25	200,000		90,000	Feb. 1875	1 00													
Rye Patch	Nev.	1,600		30,000		127,500	Aug. 1878 1 00	105,000	Dec. 1877	0 25													
St. Joseph, L.	Mo.	2,000 acs.	1,000,000	100,000	10			250,000															
Savage, G. S.	Nev.	800	11,200,000	112,000	100	3,972,500	Sept. 1878 1 00	4,460,000	June 1869	3 00											9⅜		125
Seaton, G. S.	Col.	1,700	500,000	50,000	10	*			May 1877	0 10													
Sierra Nevada, G. S.	Nev.	3,650	10,000,000	100,000	100	2,350,000	Oct.. 1873 3 00	102,000	Jan. 1871	1 00													
Silver Islet	Mch										41¾		42		40								155
Silver King	Ariz							450,000	Nov. 1878	0 50													
Standard	Cal.			50,000		50,000	July 1878 1 00	700,000	Nov. 1878	1 00													
Yellow Jacket, G. S.	Nev.	1,200	12,000,000	120,000	100	3,798,000	Sept. 1878 1 00	2,184,000	Aug. 1871	2 50							15½						50
McClinton	Cal.	1,000		60,000																			

Non-Dividend Mines.

Allodez, C.	Mch.		1,000,000	20,000	50	940,000	May 1876	5 00																
Alpha, G. S.	Nev.	396	3,000,000	30,000	100	240,000	Mar. 1878	1 00																
Alta	Nev.	600		100,000		885,000	July 1878	1 00											9¾				200
Am. Flag, G.	Col.	5,300	600,000	60,000	10	*							22c						21c	20c			2,100
Andes	Nev.	2,000		100,000		355,000	Oct 1878	0 25															
Baltimore Cons.	Nev.	1,050		84,000		1,015,000	Apr. 1878	0 50															
Benton	Nev.	600		108,000		37,800	Aug. 1878	0 35															
Bechtel	Cal.			61,000		75,000	Nov. 1878	0 25															
Bertha & Edith, G.	Vir.	645 acs.	500,000	500,000	10	*					11c	10c	10c	9c	9c		10c	9c	9c		10c	8c	45,200
Best & Belcher, G. S.	Nev.	545	10,080,000	100,800	100	438,590	Apr. 1875	1 00															
Boyle	Nev.	600		108,000		13,240	Aug. 1878	0 15															
Buckeye	Col.		2,000,000	400,000	5	*									55c		55c				54c	50c	2,700
Bullion, G. S.	Nev.	943½	10,000,000	100,000	100	2,952,000	Aug. 1878	1 50					55c		4¾		5½				4½		300
Caledonia, G. S.	Nev.	2,188	10,000,000	100,000	100	1,510,000	Nov. 1878	0 50															
Cashier	Col.		500,000	250,000	2	*																	
Challenge	Nev.	90		50,000		10,000	Nov. 1878	0 20															
Cleveland, G.	Col.	3,715	250,000	25,000	10	*																	
Cons. Imperial, G. S.	Nev.	468	50,000,000	500,000	100	775,000	Sept. 1878	0 20															
Con. N. Slope & E. C.T.	Col.	15,000	500,000	10,000	50	*																	
Dahlonega	Ga.		250,000	250,000		*																	
Dana, C.	Mch.		500,000	20,000	25	68,000	Jan.. 1863	0 50			17c	15c	15c	1⅛c	15c		17c	15c	18c	16c	17c		17,300
Dawson, S.	Ont.		1,200,000	60,000	20		1878																
Day	Nev.	1,500		100,000		55,000	Sept. 1878	0 25															
Dayton	Nev.	1,600		100,000		754,000	Apr. 1878	0 25															
De Frees	Ariz	1,500		100,000		115,000	Oct.. 1878	15															
Duncan, S.	Ont.		1,200,000	60,000	20	75,000	July 1876	41¾					4		3½	5¼							
Exchequer, G. S.	Nev.	400	10,000,000	100,000	100	480,000	Jan.. 1878	1 00															500
Gold Placer, G.	Col.		5,000,000	200,000	25						28c		27c		25c	23c	26c	24c	27c	23c	24c		34,400
Granville, G.	N. C.	357 acs.	1,000,000	100,000	10	*		0 50															
Humboldt, C.	Mch.		500,000	20,000	25	100,000	Sept 1878	0 15															
Hussey	Nev.	4,500		100,000		95,000	Oct.. 1878	0 25															
International, S.	Ont.		1,200,000	60,000	20	*					42½		42½										350
Julia, G. S.	Nev.	3,000	11,000,000	110,000	100	745,000	Nov. 1878	1 00									3½				3.15		700
Justice, G. S.	Nev.	2,100	10,500,000	105,000	100	2,638,500	Aug. 1878	1 05															
King's Mountain, G.	N. C.		1,200,000	120,000	10	*																	
Kossuth	Nev.	2,700		108,000		421,200	Aug. 1877	0 15			20c												300
Lacrosse	Col.	3,900	1,000,000	100,000	10	*					34c		33c		32c	31c	21c	30c	31c	30c	31c	30c	39 200
Leviathan	Nev.	2,000		100,000		240,000	May. 1878	05				33c	35c	31c	40c	35c			35c				600
Luzerne	Col.	4,200	5,000,000	500,000	10	*																	
Madison, C.	Mch.		500,000	20,000	25	123,000	Sept 1876	0 10															
Mariposa preferred	Cal.	44,387	5,000,000	50,000	100	1,425,000	June 1877	1 00															
" common	Cal.	acres.	10,000,000	100,000	100	1,425,000	June 1878	1'00															
McCracken	Ariz	4,500		100,000		100,000	Oct . 1878	0 50															
Martin White	Nev.			100,000		500,000	July 1878	1 00															
Mesnard, C.	Mch.		500,000	20,000	25	160,000	Apr. 1878	0 50															
Mexican, G. S.	Nev.	600	10,080,000	100,800	100	217,400	May. 1878	0 50															
Minnietta Belle	Cal.	1,500		100,000		75,000	Apr. 1878	0 50									30				29		70
Mt. Bross Tunnel	Col.	8,600	2,000,000	200,000	10	*	1878																
Navajo	Nev.	1,500		100,000		125,000	May. 1878	0 25															
New York	Nev.	1,000		100,000		760,000	Nov. 1878	0 30			60c				55c	45c		55c	50c		50c		1,050
Occidental	Nev.	1,700		40,000		72,500	Feb. 1877	0 25				55c											
Orig. Keystone	Nev.	1,500	1,000,000	100,000	10	50,000	Oct. 1878	0 50															
Overman, G. S.	Nev.	1,200	3,840,000	38,400	100	3,404,280	Sept. 1878	3 00															
Osceola, C.	Mch.		1,000,000	40,000	25	2,537,880	Nov. 1877	3 00															
Petherick, C.	Mch.		500,000	20,000	100	165,533	Mar. 1876	0 50															
Pleasant View, G.	Col.		1,200	200,000	10	*																	
Quicksilver preferred	Cal.	8,500	4,291,200	42,913	100	*																	
" common	Cal.	acres.	5,708,700	57,087	100																		
Rockland, C.	Mch		500,000	20,000	25	495,000	Jan.. 1874	1 00															
Sag. Belcher, G. S.	Nev.	160	640,000	6,400	100	244,800	Apr. 1876	5 00															
Silver Hill, G. S.	Nev.	5,400	10,800,000	108,000	100	1,296,000	Sept. 1878	0 50															
Silver Prize	Nev.	1,500		100,000		40,000	Nov. 1878	0 15															
Star, C.	Mch.		500,000	20,000	25	265,000	Mar. 1876	0 50															
Superior, C.	Mch.		500,000	20,000	25	310,000	Mar. 1878	0 25															
Sutro Tunnel	Nev.		20,000,000	2,000,000	10			0 50															
Tiptop	Ariz			100,000		120,000	July 1878				4½	4⅛	4½	4⅛	4⅞	4⅛	4¾	4¼			4	3½	6,200
Tioga	Cal.	1,500		100,000			Oct. 1878	0 20															
Trio																							
Trojan	Nev.	1,500		100,000		240,000	Oct. 1878	0 25															
Tuscarora	Nev.			100,000		20,000	Nov. 1878	0 05															
Union Cons. G. S.	Nev.		10,000,000	100,000	100	310,000	Apr. 1874	0 25															
Utah	Nev.	1,000		20,000		680,000	Oct . 1878	1 00															
Ward	Nev	1,200		110,000		66,000	Sept 1878	0 30															
Wells Fargo	Nev.	1,500		108,000		216,000	Sept 1878	0 50															

G. Gold, S. Silver. L. Lead. C. Copper. * Non-Assessable. +4 15-16.

Total Assessment levied to date ..... $57,870,313 Total Dividends paid to date ..... $151,380,231 Total Sales for the week ..... 161,580.

will be one of the best ventilated of any on the Comstock lode.

We give below, from the *Standard* of the 9th inst., a review of the stocks of the Bodie District, with their fluctuations for the week previous. It will be observed that the whole list exhibits a general decline, with no apparent reason as far as the reputed appearance of the mines are concerned. The authority quoted observes :

"We hear of several discoveries having been made during the week passed, principal among which is the ledge uncovered in the University. During the week many of our principal mining experts have visited and inspected that property, and all concur in the opinion that it has merit. The Sitting Bull and Consolidated Pacific are busily engaged hauling ore to the Miners' Mill, and we may expect soon to see them both added to the list of bullion-producing mines. Bulwer and Summit will also add to the number of gold bars exported from Bodie before many weeks, and we shall then have four or perhaps five dividend-paying mines here. It is a fact that we are getting too many idlers in our camp, and it would be well for them to remember that there will be no employment for more than the number of men now paid off every month."

The quotations for the week have been as follows :

Mines.	3	4	5	6	7
Aurora Tunnel	50	50	50	50	50
Bodie	16.75	16.25	16.00	15.50	12.50
Bulwer	16.00	16.50	16.25	16.00	16.00
Blackhawk	50	75	.....	75	90
Belvidere	1.00	1.00	1.00	.....	90
Booker Con	1.00	1.00	1.00	1.00	95
Betchtel	60	35	35	35	45
Champion	25	15	25	15	15
Con. Pacific	2.75	2.75	2.65	2.50	2.50
Dudley	1.00	90	1.00	50	1.10
Goodshaw	40	30	35	25	30
Mono	6.00	6.00	6.00	5.25	4.00
McClinton	40	40	50	60	50
Red Cloud	.....	2.50	.....	.....	1.00
Rustler	.....	.....	.....	50	.....
Sitting Bull	70	65	.....	.....	50
South Bodie	50	.....	.....	.....	.....
South Stanard	10	10	5	5	.....
Summit	1.60	1.60	1.40	1.00	1.10
Tioga	1.50	2.00	1.45	1.50	1.10
University	.....	1.00	1.00	1.00	.....

Considerable attention is being given in the East to Arizona mines. The Golden Star mine has declared a dividend from a 30 days' clean-up of $24,000, the ore yielding $47 per ton, not counting about a ton of $200 concentrations, saved each day. Prof. Cox, of Indiana, has made a very glowing report on the mineral resources of Arizona.

The *Commercial Herald* of the 12th inst. says of the market :

"Nothing is so indicative of a lull in the mining stock market as the decrease in the aggregate transactions, which is quite marked the present week, being only $1,600,000 in the regular sessions of the San Francisco Board, against $4,500,000 for a like period three weeks ago. Sierra Nevada has been less freely dealt in than during the previous week. So far the bonanza feature of this mine remains undeveloped, though the reports continue full, free, and fair."

Regarding the mines of the Comstock generally, the Gold Hill *News* of the 11th inst says :

"At the Sierra Nevada mine, work is progressing well. In a short time preparations will be commenced to connect with the Utah, by means of a large north drift on the 1700 level. At the same time a drift will be run from the 2200 station of the south winze of the Sierra Nevada, to connect with the North Consolidated Virginia shaft, when it shall reach that depth. This drift will have only about 200 feet to run to reach a point directly under the shaft.

"While this is being done the east drift on the 1600 level of the Union Consolidated will be pushed ahead to also connect with the North Consolidated shaft. This will not only ventilate but will give a splendid base for the development of the Union and Mexican mines to that depth. The north drift on the 2000 level of Ophir and Mexican is being pushed forward for the same purpose. The north drift from the 2150 station on the C. and C. shaft will soon connect with the south drift on the 2000 level of the Ophir, and on the south again with the Best and Belcher and Gould and Curry, the whole forming the finest connection of air galleries ever opened on the Comstock.

"The Ophir has now 600 tons of ore in the dump, and commenced shipping yesterday to the Brunswick mill. This ore assays from $250 to $300 per ton, car samples. Opening the 2200 station in this mine has been commenced.

"The Vivian mill, on the Carson river, has been started up on Trojan ore, of which they now have a supply on hand of about 1200 tons.

"Very hard rock has been struck in the face of the joint east drift from the Hale and Norcross. This will delay the contemplated connection with the Combination shaft longer than has been anticipated."

The Golden Star Mine of Arizona has declared a dividend of 25c. per share, amounting to $25,000

The Con. Amador has declared a dividend of 25c. per share.

The Idaho (G. V.) Mine has declared its 112th dividend of $7.50 per share, amounting to $23,250. This makes the total dividends $2,533,750. The yield for November was $57,000.

NEW YORK, December 19, 1878.

EDITOR ENGINEERING AND MINING JOURNAL :

DEAR SIR : In your edition of December 14th, 1878, we were surprised to find a flaming advertisement (over our firm name) of the "Eagle Gold Mining Co., of Stafford County, Virginia." The same was placed in your columns without our knowledge or consent. As regards our name being associated with the aforesaid company, we will say, that by the solicitation of a friend we *did* agree to act as subscription agents of the company, but in no way was our name to be used as promoters or indorsers of the enterprise. As great injustice has been done us by the appearance of such an advertisement, we simply ask that you insert this card in your next edition, and inform your readers that we do, in every way, refuse to have our name connected with the enterprise ; at the same time we do not wish to reflect any discredit upon the property or those identified with it.

Yours Respectfully, VANDEVENTER & PATTON,

Mining Assessments Delinquent in December.—The *Stock Report* of the 9th inst. reports the following :

Name.	Per share.	Amount.	Del. Dec.
Bechtel	$0.25	$15,000	11
Buckeye	.50	24,000	27
Caledonia	.50	50,000	20
Caledonia (B. H.)	.20	20,000	23
Concordia	.10	6,000	5
Champion	.25	25,000	27
Challenge Consolidated	.20	10,000	23
Daney	.20	21,600	21
Dardanelles	1.00	60,000	13
De Frees	.15	15,000	2
Dudley	.25	16,000	5
Electric	.05	2,500	21
Endowment	.25	25,000	30
Equitable Tunnel	.05	2,000	9
Father De Smet	1.00	100,000	10
Florence Blue Gravel	.03	1,800	17
Goodshaw	.10	10,000	9
Gould & Curry	1.50	154,000	23
Julia Consolidated	1.00	110,000	6
K. K. Consolidated	1.00	50,000	10
Lodi	.25	12,500	23
Maybelle	.15	9,000	5
McCrackin Consolidated	.50	50,000	23
Mammoth	.50	50,000	9
Modock Consolidated	.50	50,000	23
Magalia	.10	3,000	27
New York	.30	30,000	14
North Cons. Virginia	1.00	100,000	27
Oneida	1.50	36,000	24
Ophir	1.00	100,800	10
Oriental Cons	.50	25,000	23
Red Cloud	.50	25,000	17
Silver Prize	.15	15,000	11
South Standard	.20	10,000	10
South Utah	.05	5,000	21
Tiger	1.00	50,000	10
Tuscarora	.05	5,000	19
Watt Blue Gravel	.10	10,000	10
Wall Street Quicksilver	.10	5,000	28
Wm. Penn Cons	.03	3,000	24

The assessments delinquent each month this year have been as follows:

	No.	Amount.
January	30	$1,048,100
February	39	1,818,100
March	43	676,400
April	33	885,600
May	45	1,716,200
June	32	818,900
July	15	915,000
August	28	800,900
September	40	1,306,800
October	39	1,565,900
November	38	1,110,450
December	40	1,312,200
Totals	422	$13,944,450

ASSESSMENTS, with dates when delinquent : Scorpion, 25 cents, January 18th ; Arizona, $1, January 13th ; Alta, $1.50, January 13th ; Aurora, 20 cents, January 10th ; Vermont, 15 cents, January 14th ; North Bonanza, 50 cents, January 1st ; South Bulwer, 10 cents, January 4th ; Savage, $1, January 7th ; Hazard, 6 cents, January 8th ; Hale & Norcross, 50 cents, January 15th ; Belvidere, 20 cents, January 20th ; Blackhawk, 25 cents.

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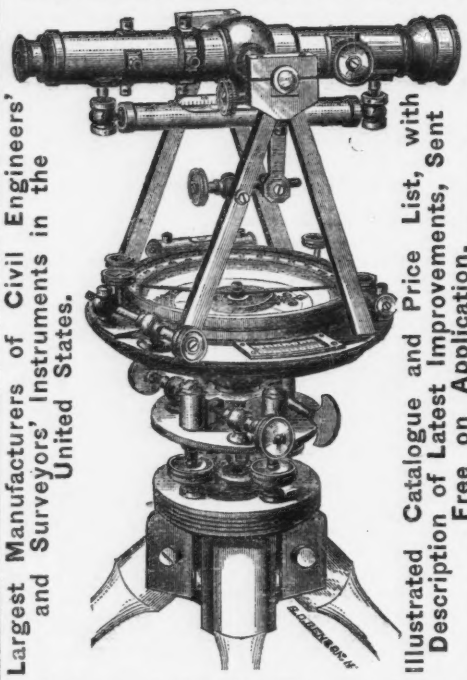

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FLAT FLUMING COMPANY. INCORPORATED JUNE 6th, 1876. 10,000 shares; par value, $100. This company owns 15,000 acres of placer claims, estimated by best authority worth $10,000 per acre. For the purpose of completing the ditch a limited number of shares will be sold. For particulars apply to H. W. TUERCKE, President, Helena, Lake County, Col.

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DIVIDENDS.

NEW YORK, December 18, 1878.

THE DIRECTORS OF THE EMPIRE GOLD MINING COMPANY have this day declared a dividend of ten cents in gold per share (par value $10) out of the net earnings for the month of November, payable at the office of the Treasurer, S. V. WHITE, No. 8 Wall street, on the 21st day of December, inst. The books to close on December 26th and re-open on January 2d, 1879.

GEO. H. HANDFORTH, Secretary.

MEETINGS.

PHILADELPHIA AND READING RAILROAD CO.

GENERAL OFFICE, 227 SOUTH FOURTH STREET.

PHILADELPHIA, December 16, 1878.

NOTICE IS HEREBY GIVEN TO THE Stockholders of this Company, that the Annual Meeting and Election for President, six Managers, Treasurer, and Secretary will take place at Musical Fund Hall, Locust Street, above Eighth, on the second Monday, 13th of January next, at 12 M.

DAVID J. BROWN, Secretary.

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MINING BUREAU,

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NEW YORK

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National Quartz Mining Company of California.

Capital, $1,000,000.

100,000 Shares, Par Value, $10.00.

C. W. REED, President, Sacramento City.

A. P. MARSHALL, Secretary and Assistant Treasurer, New York.

REGI OFFICE, FARMERS' LOAN AND TRUST CO

Office of Company, 54 Broad street, N. Y.

Dividends payable monthly.